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AUGUST, 1942

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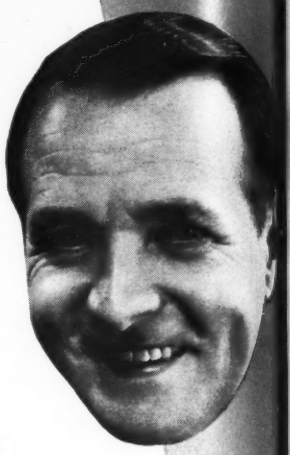

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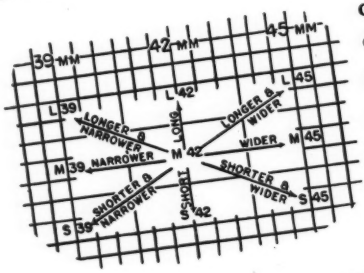

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THE DENTAL Digest

VOL. 48 NO. 8

AUGUST, 1942

Elastic Traction in the Treatment of Jaw Fractures, *Frederick B. Moorehead, D.D.S., M.S., M.D.* . . 362

A New Permanent Denture Liner for Acrylic Dentures, *R. M. Morange, D.D.S.* 366

Problems in Dental Electroforming, *Lieutenant Frank L. Basler, D.C.* 369

Direct Technique for Shoulderless Acrylic Crown Using Coin Silver Matrix 372
Claude R. Kruse, D.D.S.

Constitutional Inadequacy (An Abstract) 373

A Short Cut in Denture Construction, *J. S. Miller, D.D.S.* 374

Nasoendopharyngeal Intubation for Dental Surgery with Nitrous Oxide-Oxygen Anesthesia, *Maurice P. Cooper, M.D.*, and *Louis G. Hill, D.D.S., B.S.* 376

A Simple Method of Relining Metal Partials, *Harry L. Aronson, D.D.S.* 380

The Editor's Page . . . . . 381 Contra-Angles 384

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Elastic Traction in the Treatment of Jaw Fractures*

FREDERICK B. MOOREHEAD, D.D.S., M.S., M.D.

DIGEST

The best answer to the management of regional fractures, as to any medical discussion, is the patient himself. It is not so much a question as to whether the surgeon or the orthodontist or the dentist may manage a given fracture as it is the employment of the simplest device that will bring about a satisfactory issue.

In treating jaw fractures the principles and methods of modern orthodontia are employed; thus, the principle of elastic traction is applied, which is the principle of exerting a continuous, live, inoffensive force resulting in muscle fatigue. Reduction of any fracture is readily accomplished after muscle fatigue has been attained.

The advantages are comfort, cleanliness, satisfactory feeding, increased mobility acting as a stimulus to repair, simplicity, and accuracy — these give elastic traction a preference over other methods.

The equipment required is listed.

The methods of application of elastic traction are fully explained for various types of fractures, including: fractures of the lower jaw; the edentulous jaw; complications, such as infections in compound fractures and badly displaced short fragments; upper jaw fractures involving the anterior segment, unilateral fractures, total fractures, zygoma fractures, fractures with a depressed malar bone involvement, fractures of floor of the orbit as well as fractures without displacement.

THE MANAGEMENT of regional fractures has been the problem of the general surgeon and the surgical specialist through the years. The best answer to any medical discussion is the patient himself. Whatever method contributes most to the well-being of the sick, the deformed, and the disabled is the method of choice. In managing jaw fractures the principles and methods of modern orthodontia are employed. This system proves itself as it meets increased difficulties in restoring lost occlusion through bone displacement. The more difficult the case, the more satisfactory the method becomes. Fractured bones elsewhere are corrected by immediate reduction with immobilization. In a large percentage of jaw fractures, immediate reduction is not possible. Associated serious injuries elsewhere in the body may require delay of fracture management for days or even weeks; this is particularly true in associated skull fractures. Jaw fractures are complicated more than other fractures because of related tooth roots and also because a large percentage are compound or comminuted fractures, or both.

Up to the time of Gilmer, fractures of the jaws were poorly managed. Bandages of one type or another, combined with open surgical wiring, were in vogue. Gilmer introduced the wiring of the jaws in occlusion in which the opposite jaw was used as a guide in restoring the occlusal relationships of the teeth. Although the method is outmoded, it is still used with modifications by some surgeons and dentists.

Principle of Elastic Traction

Elastic traction is a continuous inoffensive force which results in muscle fatigue. There is no muscle offense in elastic traction and consequently no muscle rebellion. Wire fixation, the type employed in binding the two jaws together, causes a muscle irritation which amounts to an offense. Traction here ceases in a short time and is ineffective until the wires are twisted again. Elastic traction is a live force, whereas wire traction is a dead force. This gives elastic traction a preference. The orthodontist knows that gentle continuous force results in tooth movement. The osteoclasts remove the bone on one side of the root and the osteoblasts fill in the space left by tooth movement. The orthodontist uses either a rubber band or the force of a spring when moving teeth. He does not use the type of force represented by the wiring of the two jaws in occlusion. After muscle fatigue has been attained the reduction of any fracture is a simple process and accomplished without any particularly undue effort. Furthermore in elastic traction slight mobility is permitted and this

*From the Department of Oral and Plastic Surgery, University of Illinois College of Dentistry.

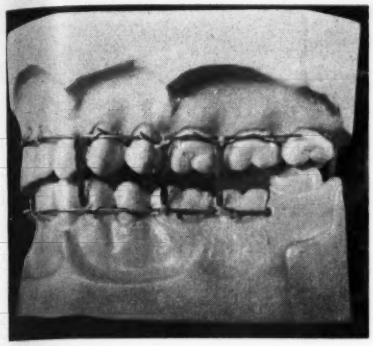

Fig. 1—Fracture between the lower left second and third molars with a typical depression of the long fragment and an elevation of the short fragment. With the third molar occluded with the upper third molar, traction will pull the long fragment into normal occlusion, and when that is reached the fracture will be completely reduced. This appliance may be used for any fracture of the lower jaw between the angle and the incisors.

acts as a stimulant to repair. For all these reasons, elastic traction is given first place in the management of jaw fractures.

Advantages of Elastic Traction

As we look at the problem frankly and intelligently, we note many advantages in favor of elastic traction:

1. *Comfort to the Patient*—The patient's teeth and gums are more comfortable with the use of this method. Certainly comfort is desirable, and to promote it should be the aim of every well-trained physician or dentist.

2. *Cleanliness*—The mouth and teeth are more easily kept clean.

3. *Feeding*—With elastic traction the patient may have a full complement of foods and is denied only the chewing process.

4. *Accuracy*—No other method offers so much certainty of occlusal adjustment.

5. *Simplicity*—The simple appliance advocated may be adjusted in from thirty to sixty minutes.

6. *Mechanical Stimulation* — The French surgeon has taught us that complete immobility is not conducive to early bone repair; fractured bones may be held in proper relationship with slight movement. The mechanical stimulation will activate the osteoblasts and repair will take place earlier.

Equipment

The following equipment will be required: (1) Angle's ribbon arch wire .028 and .030; (2) Angle's ligature wire; (3) orthodontia grass line ligature number 4 and number 5; (4) dental floss silk; (5) one pair of tissue forceps without teeth; (6) one wide artery forceps; (7) one beaver-tail burnisher; (8) one wire cutter.

We have been using Angle's ligature wire for several years but recently we have been advised to use a steel wire which may be more efficient and more easily handled. It is technically described as follows: D H Nirosta K A 2 S wire .012. It is entirely optional whether this or the ligature wire should be used.

Method of Application of Elastic Traction

It is sometimes advisable to take a wax or modeling compound impression from which a simple plaster model is made. To this the ribbon arch wire is fashioned. The arch wire, however, may

Fig. 2—Rotating fracture of the lower jaw on the right side, the break being between the cuspid and first bicuspid and, naturally, through the right ramus or right condyloid process. It will be noted that the teeth in the short fragment are fastened en bloc. With the traction of the rubber bands and the spring of wire, this segment will quickly be pulled into position.

be adjusted to the teeth within the mouth without a model when conditions are favorable.

Lower Jaw—The following simple mechanism is sufficient and competent for all fractures of the lower jaw in which there are sufficient strategic teeth to use for traction purposes (Figs. 1, 2, and 3):

1. The ribbon arch wire is attached to the upper teeth, Angle's ligature wire being used on the molars and bicuspids, and dental floss silk or grass line ligature on the incisors. The cuspids are not employed, because the neck of the tooth does not correspond to the position of the neck of the first bicuspid or the incisors.

2. On the lower jaw the ribbon arch wire is shaped to the arch and attached to the molars, bicuspids and incisors on the normal side and extended to the point of fracture on the fractured side. It is made secure to all available teeth up to the fractured point.

3. When the two arch wires are in position, orthodontic rubber bands are placed from one arch wire to the other, and attached with dental floss silk or orthodontia grass line ligature.

Edentulous Jaw—If the dentures are available, they may be used as splints with the same method that is employed in total fractures of the upper jaw. That method is presently explained under the heading of Upper Jaw Fractures. If the dentures are broken, they may be repaired; or, if they have been lost or repair is not possible, vulcanized splints may be substituted. The matter of occlusal relationships is not so pertinent when all the teeth are missing, because any slight departure from the relationship of the two arches may be compensated in the construction of the new full upper and lower dentures. In this case, however, one must bear in mind the breaking up of the normal muscle equipoise and the physiologic position of the joint. In the building of new dentures, therefore, these points must be kept in mind.

Complications

1. *Infection in Compound Fractures*

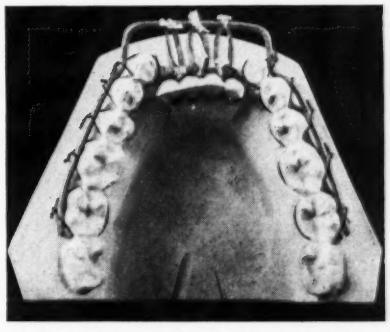

Fig. 3—A fracture largely confined to the alveolar process, the fractured segment containing the four incisor teeth in the lower jaw. The four teeth are fastened en bloc and traction is applied to the extended wire which is well advanced beyond the broken segment to give sufficient space for traction

Fig. 4—A fracture limited to the six upper anterior teeth in which the broken segment confined to alveolar process is carried backward. If such a case cannot be corrected by digital manipulation the appliance illustrated will be sufficient to put the segment back into position.

—Cleanliness is paramount. In any jaw fracture the mouth must be put in a state of cleanliness before anything else is done. The use of a Berlin abscess syringe point adjusted to the shank of any ordinary water syringe may be used advantageously in irrigating compound fractures with an iodosaline solution. If proper precautions are taken, infection need not develop.

2. *Short Fragments Badly Displaced*—In a fracture of the lower jaw in the molar region in which the molar and bicuspid teeth are missing, the short fragment is likely to be pulled up, sometimes under the zygoma.

A. Splint of Modeling Compound: The simplest method of managing the short fragment is to make a splint of modeling compound:

1) Place in the mouth a properly shaped piece of soft compound, and have the patient close the teeth to a point well below normal occlusion.

2) The compound is chilled, removed, and trimmed.

3) The compound is then placed in the mouth and will be found to engage the short fragment.

4) With external traction, after the method of a total upper jaw fracture device, the short fragment may be pushed back into position and into relation with the long fragment.

B. Alternative Method: When the method just described is not elected, the short fragment may be pulled into position in the following manner:

1) On the posterior border the skin over the ramus is incised and the bone exposed.

2) The bone is perforated in one or two places on the border.

3) A fine piece of wire is inserted into the perforations and out through the skin opening which is sutured securely.

4) A head cap, in which is included a sturdy wire, is then placed with the wire reaching down the neck and opposite the angle of the jaw.

5) Elastic traction is employed between the wires in the jaw and the external wire attached to the head cap. In this way the short fragment is pulled back into position.

C. Circumferential Wiring: Another method of bringing the short fragment into position is the employment of circumferential wiring:

1) Pass a suture through the skin beneath the jaw on the buccal surface of the short fragment and pass over the top of the fragment and down through the floor of the mouth, through the skin to meet the other portion of the ligature.

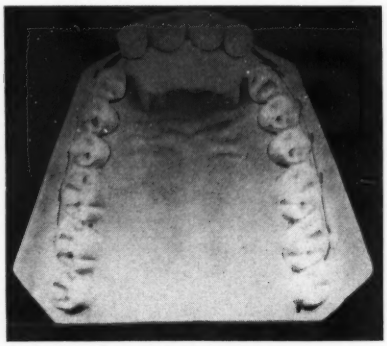

Fig. 5—A fracture of the upper jaw with broken segment carrying the four incisor teeth. This may be corrected when possible by digital manipulation or by the simple appliance indicated here. Traction in such a case may be applied to the lingual aspect or to the labial and buccal aspects, or both.

2) The ligature is replaced with a piece of steel or silver wire and the ends are twisted together over a pad of molded lead.

3) A similar pad of lead is placed on the mucous membrane over the short fragment.

4) The wires are pulled tightly until the fragment is in position and then twisted together.

Where they can be employed, methods A and B are preferable. We discourage the older method of doing an open operation and wiring the two fragments together. This is apt to be accompanied by infection and sometimes necrosis.

Upper Jaw Fractures

Anterior Segment—Fractures of the upper jaw are less frequent than lower jaw fractures and less likely to be complicated. A common fracture is in the upper anterior segment involving the four or six anterior teeth and this is limited usually to the alveolar process. The segment may be molded into position with the thumb and finger, and held there by a figure-of-eight ligature employing either dental floss silk or grass line ligature. If it cannot be reduced in this way, the appliance shown in Figs. 4 and 5 will make the correction.

Unilateral Fracture—Another common type of upper jaw fracture is the unilateral fracture which may involve the maxillary sinus and zygoma. Sometimes this fracture may also involve the floor of the orbit. The mechanism employed is a reverse of the one employed for lower jaw fractures.

The ribbon arch wire is placed on the lower jaw involving bicuspids, molars and incisors on both sides, and a similar arch wire is placed on the uninjured side of the upper arch, extending up to the point of fracture. Traction is then placed between these two arch wires and the lower jaw will be pulled up to engage the broken segment and force it back into place. As soon as oc-

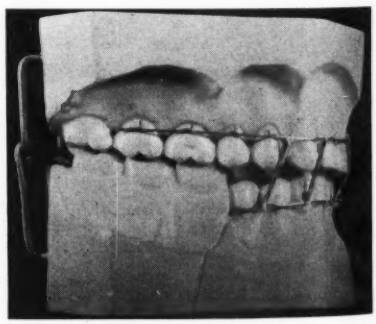

Fig. 6—This is an important illustration of placing traction exactly in the line of fracture which can be determined by the roentgenogram. Rubber bands should be placed slightly in advance of the line of fracture in order to facilitate the reduction. If they are placed perpendicularly or distally the reduction will be greatly delayed, if not completely prohibited.

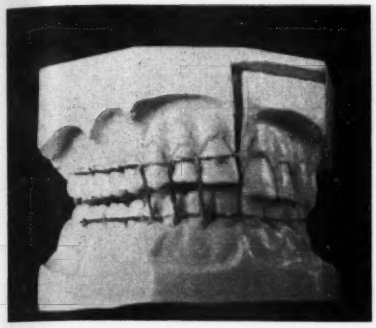

Fig. 7—A unilateral fracture of the upper jaw with the customary downward displacement. Angle's arch wire placed on the lower teeth and also on the upper teeth on the uninjured side up to the point of fracture. Traction between these two will draw the lower jaw up against the fractured segment and force it into position. When occlusion is reached on the sound side, traction automatically ceases.

clusion is reached on the uninjured side, traction automatically ceases (Figs. 4, 5, 7, and 8).

Total Fracture—Total fractures of the upper jaw may involve the bones of the nose, the malar bone, maxillary sinuses, zygoma and the floor of the orbit. All total upper jaw fractures are depressed and the method of treatment is directed toward putting the jaw back into its normal position. For this a head starch bandage is made:

1. Cover the head with a stocking, such as is used for fracture of the legs or arms. The stocking is cut at the necessary length and the upper edges are sewed together.

2. Over this the starch bandage is applied. The bandage is best made by preparing the starch in the same manner as it is prepared by the laundress and dipping the crinoline bandages to saturate them with the starch material.

3. The first layer is placed down as far as the eyebrow, back and under the occipital prominence in order to prevent shifting. The entire head is covered with the bandage and as it is applied, a little of the fresh starch material is spread over the surface with the hand to insure strength. Too much starch should not be used, as it will interfere with setting.

4. A chin cap is made by folding the bandage back and forth over itself on a table until several thicknesses are obtained. It is then molded over the chin and back to about the molar region on each side.

5. A dry bandage is then placed over this to hold it in position, passed both around the neck and over the head.

6. Both casts should be allowed to remain for twenty-four hours, when they are removed and properly trimmed.

7. Hooks, from the ordinary hook and eye used in women's clothing, are sewed to one-half inch strips of adhesive plaster and placed in proper relation over the head cast and also on the chin cap. Two of these are placed on each side of the head cast and the chin cap and rubber bands; one on each hook, or four in all, are placed. If needed, additional bands may be used.

It must be remembered that it is not the amount of traction that is important but the continuous pull that fatigues the muscle (Figs. 7 and 8).

Zygoma Fracture—Most fractures of the zygoma are easily reduced:

Under a local anesthetic an incision is made beneath the zygoma, through the mucous membrane of the mouth. This incision will make it possible to expose the zygoma in its entirety. The point of fracture is easily exposed and the bone elevated to a point of complete reduction.

If the bone does not remain in a state of reduction, a small pack made from iodoform gauze, saturated with compound tincture of benzoin may be inserted. Leaving a small space for the end of the gauze pack, the incision should be closed with fine catgut. After three days, the pack may be removed, the wound carefully irrigated with an iodosaline solution and repacked. After a week or ten days, the pack may be left out.

Depressed Malar Bone—A depressed malar bone implies the breaking in of the anterior wall of the maxillary sinus. The depression may be corrected by the method employed in reducing the fracture of the zygoma. The bone, once reduced, may stay in position; but if not, it sometimes becomes necessary to open the maxillary sinus under the depression and pack it with iodoform gauze saturated with compound tincture of benzoin. The pack may be removed after two or three days, the sinus irrigated with a bland solution, and replaced if necessary. This whole procedure may be carried out without any

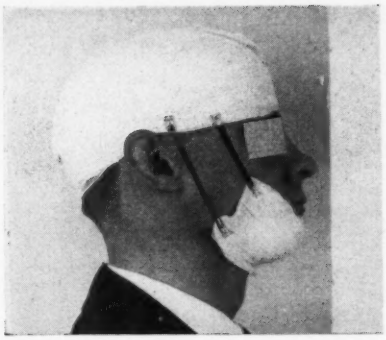

Fig. 8—A simple device showing the traction method in correcting total fracture of the upper jaw with downward displacement.

infection of the sinus if proper care is taken. The mucous membrane of the sinus is sturdy and will withstand reasonable abuse.

Floor of the Orbit—A fracture of the floor of the orbit may or may not be accompanied by a fracture of the ascending or orbital process of the upper jaw. Both of these fractures are best reduced by the open method. The bones are easily exposed through a small incision and the reduction is made directly. If the fractured bones do not remain reduced, they may be fastened by a single strand of chromic gut, passed through the ends where small openings are made. This suture will hold the bones in proper relation until callous formation will have begun. It is not necessary to state that in the surgical aspects of these fractures the strictest asepsis must be observed. This phase of the problem demands a surgical background with good surgical judgment.

Fractures without Displacement

Looking at the whole problem of jaw fractures, it should be emphasized that in any case in which there is no displacement, no treatment whatever should be undertaken. This is particularly true in fractures of the ramus and condyle. If there is displacement in either one of these fractures, simple traction may be applied to restore occlusion. One does not have to be concerned with the displacement of the head of the condyle, because repair will take place, and in whatever position it may be placed, the joint will function.

Fractures of the coronoid process do

(*Continued on page* 368)

A New Permanent Denture Liner for Acrylic Dentures

R. M. MORANGE, D.D.S., Chicago

DIGEST

A new liner, intended for acrylic dentures only, is described and its use explained.

The liner has the quality of lasting wear.

The chemical composition and characteristics are discussed, the chemical base being given as pyroxylin, the same as the base of acrylic with which it is homogeneous.

Although the procedure is outlined in detail, there are three major steps to be considered in relining: (1) the impression; (2) muscle-molding; (3) compression and olive oil treatment — all three of which are performed with closure of the back teeth in retruded centric relation.

The critical point of time in the use of the liner is during the first trial in the mouth with cellophane.

THE PERMANENT LINER is intended for use on acrylic dentures only. No dentist need lose a patient because of unstable dentures. A new and completely satisfactory denture service can be established with the liner now available which offers the following usages: (1) servicing new dentures; (2) servicing of unstable dentures; (3) in the construction of immediate dentures; (4) for lasting, perhaps lifetime, service. These services, employing the liner proposed, may be provided at the chair and without laboratory processing of any kind.

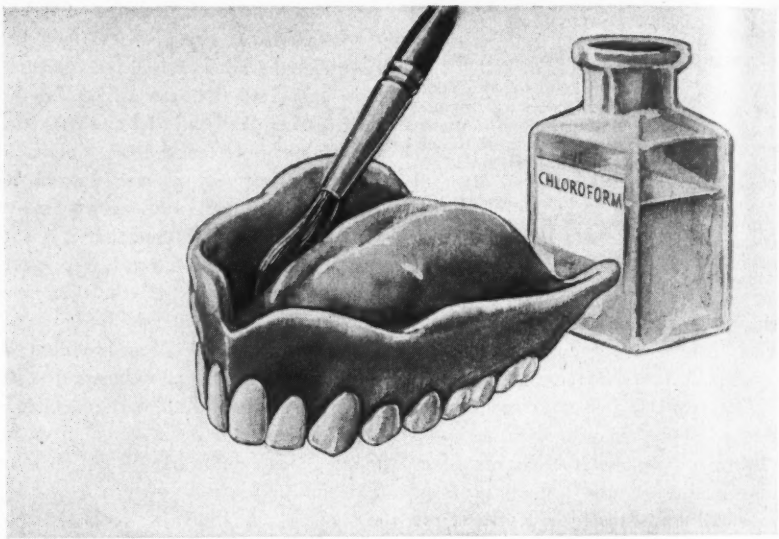

Fig. 1—Application of chloroform with a brush to the palatal side of the denture base, to which will be added the lining material.

Composition and Characteristics

1. The liner is a pure chemical com-

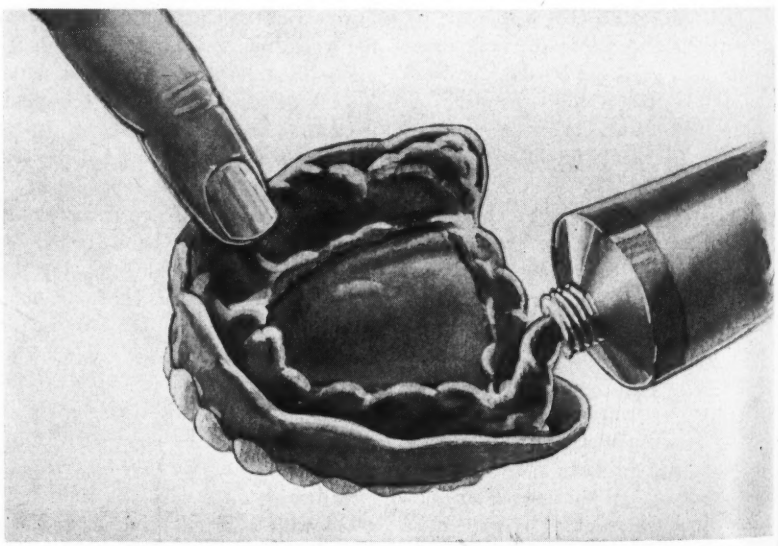

Fig. 2—Application of the lining material, showing its adaptation with the fingers to the proper areas. The palate is not covered.

pound, not a mixture. Its base is pyroxylin, the same as the base of acrylic resin which is a guncotton compound obtained from natural vegetation.

2. The pyroxylin is reduced to a liquid through the use of eleven affiliated materials.

3. These materials are fermented within themselves until the fermentation has been completely exhausted. The materials, in a body, are then put through a curing process over a period requiring sixteen days. This process produces definite solids. The solids at this stage are distilled in a specially prepared still. The materials that are distilled off are then tubed, and carried through a final eight-day temperature process ranging from 4° below zero to room temperature.

4. The color is chemically grown through natural vegetation, and it can be stabilized to a definite shading.

5. The ester evaporates on tube exposure, solidifies on the clean surface of the acrylic and chemically unites with it.

6. The tensile strength of the liner is 2100 pounds, 3½ times the strength of acrylic.

7. There is no water absorption.

8. Dimensional changes occur at 200° F.

9. All repairs should be done below 200° F. if the liner is present.

10. Maximum hardness is reached in twenty-four hours.

Advantages

1. Mechanically aged, the shelf life of the liner product in a closed metal tube is long.

2. There is no toxicity.

3. Mouth acid and alkaline effects are neutral.

4. The tissue tolerance to the product is good inasmuch as it has healing qualities of permanent endurance.

5. Union with an acrylic base is homogeneous.

Procedure

There are three major steps to think of in relining: (1) the impression; (2) muscle-molding; (3) compression and olive oil treatment—all three must be performed by closure of the back teeth in retruded centric relation.

Impression for a Full Upper — 1. Clean the denture by painting the inside surface and peripheral borders with chloroform.

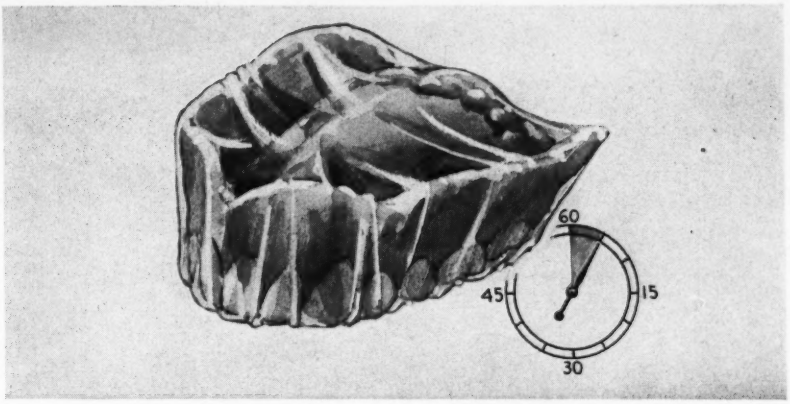

Fig. 3—Wet cellophane is placed around the denture that carries the lining material. The denture is placed in position and the operator counts 1-2-3-4-5 before the denture is removed.

2. The liner material is placed on the inside of the denture, in the ridge hollow, and across the distal border. Force the liner with the fingers toward the labial and buccal surfaces. Cover the periphery and seal with the fingers. The hard and soft areas of the palate are not covered.

3. Wrap in wet cellophane. Thin cellophane soaked in cold water is placed over the entire mass before insertion in the mouth.

4. Place in the mouth. Push the denture backward while the patient bites into occlusion, seats and holds with the back teeth, forcing the liner to all areas. Count five: 1, 2, 3, 4, 5.

5. Remove when the patient, by a light stinging sensation, feels the liner penetrate the cellophane. Blow out the denture and place in normal salt solution for five minutes.

Muscle-Molding — The liner should now be adhesive with all parts of the denture.

1. Remove all surplus with curved shears. If there is insufficient liner on any area, paint the area with chloroform and add the necessary amount of liner material.

2. Seat in the mouth as previously. Have the patient muscle-trim forcefully, puckering the lips, then opening wide. Allow to remain in the mouth until there is a slight burning sensation.

3. Remove the case and place in salt water for about ten minutes.

Compression and Oil Treatment—1. Dry the case and paint with olive oil.

2. Return to the mouth for the patient to bite hard and muscle-mold forcefully to compress the liner. Again, if there is insufficient liner, add as re-

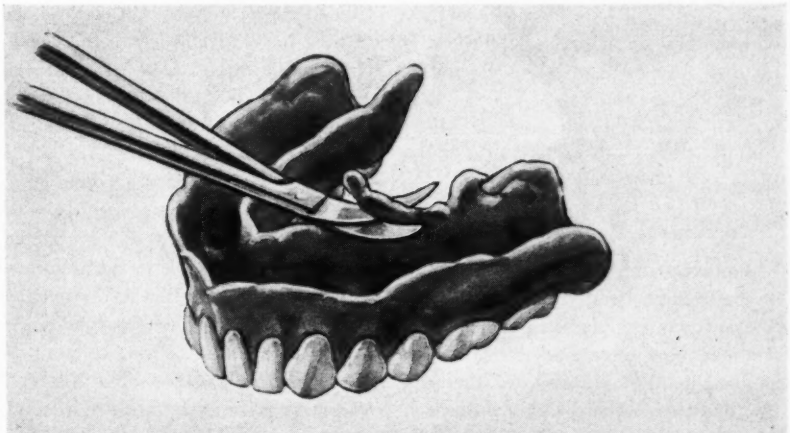

Fig. 4—The trimming of the lingual border of a full lower denture; curved shears are used.

Fig. 5—Application of olive oil to the material after the case has been properly muscle-trimmed.

quired, and leave in the mouth until there is a slight burning sensation. The patient will indicate when the sting is felt. Continue this operation until all feeling of distress has disappeared.

3. The case is now placed in salt water for two hours, after which the denture may be trimmed with a sharp knife. After trimming, if any rough or ragged edges remain, paint them with chloroform and smooth.

4. In the case of the lower denture, hold the denture in position by placing index fingers on posterior teeth. Have the patient open the mouth as wide as possible and extend the tongue forward, backward and laterally. This will roll the liner over the periphery of the denture, and it will be free from muscular interference.

5. The liner continues to get harder, and in twenty-four hours the maximum setting takes place. In many instances it is necessary to remove some of the palate of the original denture to prevent opening the bite.

6. Gentle polishing completes the procedure.

Cautions

The critical point of time in the use of this liner is during the first trial in the mouth, and then only if a large surface is covered, such as in a full upper or a full lower. For these the liner is covered with the wet cellophane at the first trial especially. Partials, postdam and frontal areas alone need no cellophane.

Under no circumstances allow the patient to wear the denture the first night. When the patient is not wearing the denture, it should be submerged in cold salt water. The color is permanent and does not change.

5505 *South Ashland Avenue.*

Elastic Traction in the Treatment of Jaw Fractures

(*Continued from page* 365)

not lend themselves to management and should not be disturbed. Patients with fractured jaws will give hearty cooperation and, if proper instructions are given, they will carry on successfully without any appliance where there is no displacement and the occlusion is normal. When given the choice of having an appliance adjusted or going without it, they will invariably elect the latter and do so successfully.

Comments

A point of importance is the placing of the traction bands in relation to the line of fracture. This line will be shown on the roentgenograms, and the traction bands should be related, so that the fractured bones will be moved on each other without any binding. The bands really should be placed a little in advance of the line of fracture in order to prevent any impaction (Fig. 6).

One cannot describe the many types of fractures of the jaw, but the application of the principles and methods described here, together with the accompanying illustrations, will be sufficient when coupled with the surgeon's genius to manage the most difficult case with a successful issue.

Although all fractures come under the jurisdiction of the surgeon, the orthodontist and the dentist may participate with satisfaction in the treatment of jaw fractures. Here and there orthodontists have assumed the function of treating fractures without cooperation of a dentist or a surgeon, but this is not altogether wise or safe. Most fractures of the jaw may be treated simply and may well be in the hands of a good surgeon or a good dentist or both. There should be no feeling about the matter of control, because whichever person or method will be most likely to serve the patient should be chosen. The spirit of cooperation is paramount. The orthodontist or the dentist or both should give whatever assistance is possible in the management of a jaw fracture. It is true that the seriously complicated fractures may require the technical skill of the orthodontist. He alone may be able to make such appliances as may be indicated or needed in a given case. It is not so much a question as to whether the surgeon, the orthodontist, or the dentist may manage a given fracture as it is the employment of the simplest device that will bring about a satisfactory issue.

808 *South Wood Street.*

Problems in Dental Electroforming

FIRST LIEUT. FRANK L. BASLER (Dental Corps) Fort Knox, Kentucky

DIGEST

1. Bad deposits in plating are due to excessive admixtures of some compound, or to excessively large crystals.

2. Excessive admixture of any compound can be eliminated by changing the conditions, so that the compound cannot precipitate.

3. Increasing current density (amperage), increasing the potential difference at the cathode, or lowering the temperature decreases the size of the crystals.

4. The crystal size is decreased when there are present at the cathode surface substances that are absorbed by the deposited metal.

5. If a given solution will give a good deposit at any current density, it will give a good deposit at any higher density, provided the conditions at the cathode surface are kept constant.

6. Treeing is facilitated by a high potential drop (voltage) through the solution, and by conditions favorable to the formation of large crystals.

WHEN DIRECT CURRENT is passed through acid copper sulphate solution between two copper electrodes, the copper dissolves from the anode or positive side, and deposits on the cathode or negative side. For this reason, it is obvious that there is a tendency for the solution at the anode to increase in concentration because the copper has gone into solution, and decrease in concentration at the cathode side because the copper has been removed. When the solution at the anode side becomes stronger than the main body of the solution, it is more difficult for the copper to dissolve; hence, it requires more voltage to continue the passage of current. At the cathode it is more difficult to deposit; hence, a higher cathode voltage. This is called polarization. After the plating process has begun, the voltage may be reduced, and the amperage increased.

By increasing the current density, we increase the rate of plating and the quality of the deposit; however, when the current density is in excess of the other conditions, such as concentration, acidity, and temperature, there is a tendency to produce "treed" deposits. When the current density is in excess, the deposit is burned or powdery. This burned or powdery portion usually contains some basic material, such as the basic salt or hydroxide of the metal. These precipitate because the cathode film *p*H also increases. These changes are consistent with the fact that as the current density is increased, the cathode film becomes impoverished in metal and polarization increases.

A high current density can be used in this case by increasing the amount of metal supply at the cathode. This is done by increasing the concentration of the solution, and by agitating the solution during the plating process. This agitating process, however, will stir up any sediment or sludge that may have formed. The sludge can be reduced to a great degree by having a number of shallow box-like baffles on the bottom of the tank. Mechanical agitation is better than bubbling air through the solution, inasmuch as air will sometimes cause the copper to oxidize, and the air decreases the throwing power of the anode.

It will be observed that the portion of the cathode or object being plated, nearest the anode, if it is irregular in shape, will be thicker than that portion of a greater distance. This is due to a decrease in the throwing power of the solution. There are methods of correcting this, but it is not necessary to discuss them here inasmuch as the thinnest portion of the deposit, when completed, will be of adequate thickness.

Foreign substances have been added, and are now added by men associated with the electroplating industry, to improve the quality of the deposit. Glue, glucose, and dextrose in small quantities are sometimes used. We found, however, that by adding phenol (0.13 ounce per gallon) in the form of phenolsulphonic acid, the density of the deposit could be increased considerably. Phenolsulphonic acid can be made by heating equal volumes of phenol and sulphuric acid for one hour at 212° F.

Formulas for Plating Solution

Formula 1

Copper Sulphate	33 ounces to 1 gallon of distilled water
Sulphuric Acid	10 ounces to 1 gallon of distilled water

Current density from 8 to 16 amperes per 16 square inches

Temperature range from 77° F. to 95° F.

This solution must be agitated.

This formula will produce a rapid deposit of copper. The surface toward the impression will be smooth, but the surface toward the anode will be a little rough; however, this will not injure the final product in any way.

Formula 2

Copper Sulphate	27 ounces to 1 gallon of distilled water
Sulphuric Acid	6.5 ounces to 1 gallon of distilled water

Current density from 2 to 4 amperes per 16 square inches

Temperature range from 77° F. to 122° F.

This formula is much slower in its action. The only advantage it would have is in producing a smoother deposit on what will be the reverse side, but this is of no advantage for dental

use. Having a wider temperature range, it is, to be sure, a little easier to use during the summer months, and it does not require agitation.

The materials that are used in the solutions may be purchased in any drug store. The copper sulphate should be in the blue crystalline form. It contains a number of impurities in small quantities. These impurities are not in sufficient concentration to hinder the plating action in any way. It is important, however, that the sulphuric acid be chemically pure.

Analysis of Solutions

In order to produce good deposits consistently, either fresh solutions must be made rather frequently, which is relatively expensive, or a method must be used that will accurately replace ingredients that become depleted through use or evaporation. To maintain the proper relative concentration, it is necessary to have a simple, quick, and inexpensive way of analyzing the solution with reasonable accuracy.

Determination of Acid Content of Solution—To determine the acid content of the solution, add 15 cc. of distilled water to 10 cc. of the solution. Then add a few drops of methyl orange (1-1000 aqueous solution). A standard solution of sodium hydroxide is then run through a burette, or an old hypodermic syringe, an account being kept of how much alkali is being used, until the purple disappears after shaking. The acidity may then be computed by multiplying the amount of alkali used by 0.049 by $\frac{1000}{10}$ by 0.134. This gives the number of ounces of acid present per gallon of solution.

Estimation of Copper Sulphate Content—The amount of copper sulphate in the solution (Fig. 3) may be estimated to within about 5 per cent with a set of homemade colormetric standards. To make these standards, procure some empty anesthetic ampules. When the original solution is being made, add a definite amount of copper sulphate, by weight, about half the amount. Dissolve this and fill one of the tubes, and label. Add a definite amount of copper sulphate to the solution again, increasing its concentration. Fill another ampule. Use four ampules in this way, reserving the fifth and last for the completed solution with the acid. These are then kept and used in the future as standards. To use them, fill an empty ampule with the depleted solution. By comparing the color of the solution with that of the standards, the amount of copper sulphate to be added can be estimated.

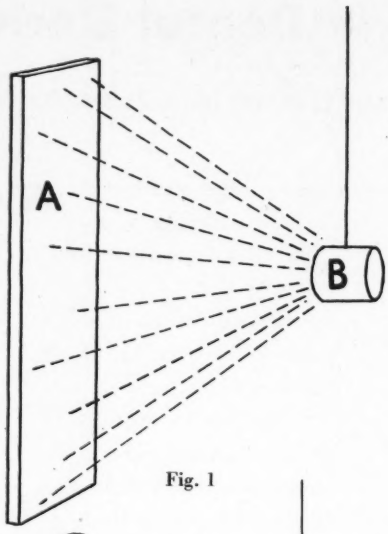

Fig. 1

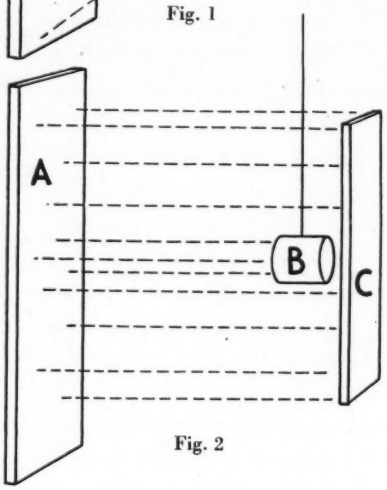

Fig. 2

Fig. 1—A, Anode; B, Cathode.
Fig. 2—A, Anode, B, Cathode; C, auxiliary cathode.

When the tank is filled for the first time, mark the solution level along the sides. Before testing the solution in the future, add distilled water to bring the level almost to this line. When the solution is not in use, it should be kept in well corked bottles.

Improvised Tank

The tank may be made inexpensively from a rubber or composition storage battery case with the separator walls removed. This will easily hold a gallon or more without danger of spilling.

Choice of Anode Metal

The anode, inasmuch as it is our source of supply of metallic copper, should be of the proper type of metal. There are four principle groups or types of copper that may be used: cast, electrolytic, rolled, and extruded.

Cast Copper—Cast copper is the least satisfactory, because: (1) in casting there is usually cuprous oxide formed; (2) the crystalline structure is coarse; (3) there is an opportunity in cooling for the cuprous oxide and any impurities that may be present to segregate between the crystals. In general, such impurities increase the solution pressure of the copper, and there is a tendency for the copper to dissolve around the grains, allowing the latter to fall out as a sludge, which usually causes rough deposits.

Electrolytic Copper — Electrolytic copper is better. The texture is somewhat spongy, and the crystals are large. This is why excess copper collected on the auxiliary cathode should not be reused.

Rolled or Extruded Copper Preferable—Rolled or extruded copper is the best type to use as anodes. In reheating and rolling, or extruding, a finer crystalline structure is produced, and the mechanical working tends to produce copper with a uniform solution pressure.

Solution Pressure—When any metal is dipped into a solution of one of its salts containing ions of that metal, there is a certain tendency for the metal to go into solution and form positively charged ions of the metal. This is called solution pressure.

Designing Anode and Selection of Current

In designing the anode for personal use, select a thick piece, about one-fourth inch or so, and as large as may be conveniently put or suspended at one end of the tank without touching the sides.

The current is direct current, and the supply may be a dynamo, storage batteries or a transformer-rectifier operating from alternating current. For

convenience and economy this is the type that we selected for our use. It converts alternating to direct current, and reduces it to a sufficiently low voltage. The unit should have a voltmeter and an ammeter to measure the electricity going to the tank. It should have a heavy duty variable resistance to control the current. The output connections should be plainly marked "positive" and "negative" to prevent confusion. The converter should supply a constant even stream of direct current, and be of sufficient size that it will not be working at full capacity, to insure a long working life.

Procedure

Preparation of Impressions for Inlays or Crowns—1. In the preparation of inlay or crown impressions, the first requisite is a sharp accurate impression. Any customary technique may be used for this impression.

2. The impression is lightly lubricated with some oil, such as mineral oil, and all excess removed from crevices and pits with a chip blower.

3. Either copper bronze powder or fine pulverized graphite is dusted in the impression.

4. The powder is burnished thoroughly with a specially prepared camel's hair brush. These brushes are medium-sized, round, artist's brushes that have been trimmed rather short. Cotton has a tendency to leave small fibers in the impression.

5. All excess powder should be gently removed with a chip blower.

6. A thin strip of about 28 or 30 gauge copper is fit around the copper impression band about 1 mm. from the margins. After drawing it up tightly, secure the strip in a small battery clip.

7. More powder is burnished over this copper strip to insure a good electrical connection with the surface to be plated.

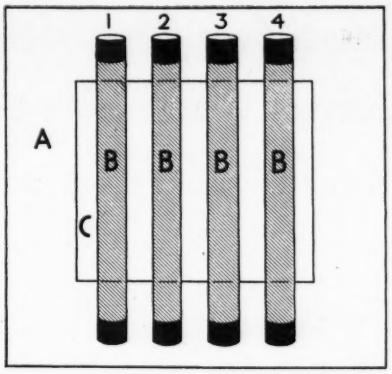

Fig. 3—A, Cardboard frame; B, anesthetic tubes filled with varying percentages of solutions of copper sulphate; C, cut out section covered with wax paper to diffuse light. To use, fill empty tube with solution to be tested. Lay between two tubes and move over until color nearly matches. Add more copper sulphate to solution and retest. Do this until it matches fresh original solution.

8. Plating may now be done.

Preparation of Impressions for Dentures, Partials, or Bridges—1. Impressions for dentures, partial dentures, or for bridgework, made of porous material, such as plaster of Paris, must first be thoroughly dried.

2. The impression is coated with several layers of thin shellac or varnish on all surfaces to make it more or less waterproof.

3. The surface to be plated is lubricated and powder is dusted on in the same manner as for the inlay impression.

4. When placing the impression in the copper sulphate solution, care should be taken that there are no air bubbles on the surface, and that the working surface is turned toward the anode. This is now the cathode.

Preparation of Auxiliary Anodes—The cathode area should approximate the area of the anode (Figs. 1 and 2). Several auxiliary cathodes should be prepared by taking thin sheets of copper and cutting them in several different sizes. These are to be suspended behind the impression cathodes. The smaller the impression, the larger the auxiliary. The auxiliary seems to balance the plating process, and permits a higher current density to be used on small restorations.

Control of Current Density—The converter is now set at high voltage-low amperage ratio to start. In about ten minutes, remove the impression or object and examine it. If there are any bare spots, rinse in clear water, dry, lubricate the spot carefully, and burnish a small amount of powder over it. The progress must be observed from time to time until all bare spots are covered with a layer of copper. The current density may then be increased.

Plating Accomplished—After a deposit of sufficient thickness has been acquired by the cathode, it is removed, rinsed, and poured in plaster of Paris or stone. When this has hardened, the impression is removed, and the remaining powder is washed off with soap and water.

Comment

The acid-copper method just described is better for dental purposes than a method known as the cyanide bath. The acid bath plates heavier, faster, and is more fool-proof. The ingredients cost less, and are easier to maintain.

Seventy-Third Observation Group
United States Army Air Force
Office of the Dental Surgeon
Godman Field.

DENTAL MEETING DATES

Montreal Dental Club, eighteenth annual clinic, Mount Royal Hotel, Montreal, September 23-25.

•

The American Society for the Advancement of General Anesthesia in Dentistry, annual fall meeting, Midston House, New York, October 26.

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The Chicago Dental Society, 1943 Midwinter Meeting, Palmer House, Chicago, February 22-25, 1943.

New Jersey State Board of Dental Examiners, regular meeting, September 15-19. The Spring meeting will be held April 5-10, 1943. For information write to Doctor W. E. Wilson, Secretary, 150 East State Street, Trenton.

Direct Technique for Shoulderless Acrylic Crown Using Coin Silver Matrix

CLAUDE R. KRUSE, D.D.S., Colfax, California

DIGEST

A method is described for making a shoulderless acrylic crown in which a matrix of coin silver is used. The method is exactly the same as that previously reported[1] for making the cast gold crown for molars, but there are modifications for use on bicuspids and anterior teeth. When used on bicuspids and anterior teeth, the buccal surface of the matrix is cut out to prevent any possibility of having the matrix show through the acrylic. For anteriors both the buccal and lingual of the matrix are cut out, allowing a point of the metal to extend up the proximal surfaces.

The silver has been found to work as well as gold; thus an inexpensive durable crown is had which eliminates the need for a shoulder preparation.

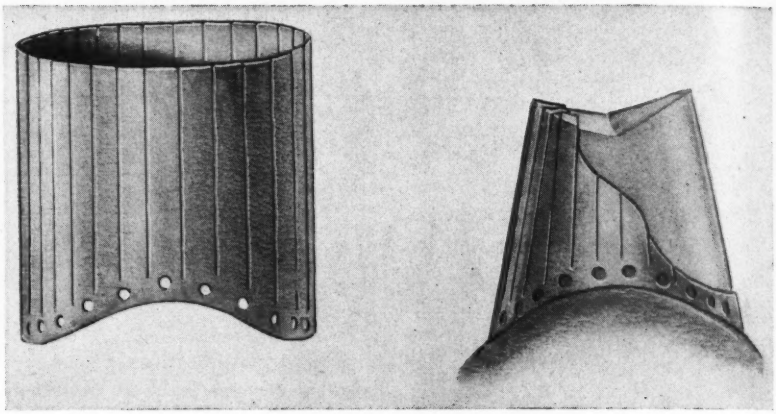


Fig. 1—Left, matrix before the buccal portion is removed. Right, matrix after buccal portion has been removed.

Technique

1. In preparing the tooth, the preparation must be tapered so that the matrix fits tightly at the gingival and slightly under the free margin of gum tissue. Cut the occlusal down to allow for good thickness of acrylic.

2. Coin silver is rolled to gauge 36, and cut to dentimeter measurement, wide enough to permit burnishing slightly over the occlusal surface of the prepared tooth. If soft silver plate is used, 34 gauge is required. Solder with silver solder. Silver was at first used for the matrix only to reduce the cost; but I found that for some reason unknown to me the acrylic makes a better union with the silver than it does with the gold.

3. The silver matrix band is slit all around to within 2 mm. or 3 mm. of the gingival. The band is trimmed to contour and holes are punched at intervals all around with size 2 round bur. The holes in the matrix are best put in with a spear point drill rather than a round bur. The matrix is then stoned smooth and waxed. If the matrix is for a bicuspid, cut the matrix away on the buccal surface and part of the occlusal, leaving 3 mm. across the buccal surface at the gingival. A small piece of 29 gauge sheet wax is warmed and pressed firmly over the opening in the matrix while on the tooth. The wax is then sealed to the matrix with a hot instrument, and the excess is trimmed away.

4. Heat any good neutral tint wax and trace it over the matrix to sufficient bulk. Carve to contour and occlusion. Remove the carved wax form from the tooth. Add wax on the proximal surfaces, so that good contacts may be had after polishing.

5. If the crown is to be for an anterior tooth, cut the band away on both the labial and lingual, then press warmed 29 gauge sheet wax over the preparation to come in contact with the edges of the matrix, and seal to the complete matrix, removing all surplus material. Trace on the casting wax. The matrix is allowed to extend up the proximal surfaces in a wedge shape.

6. When suitably shaped and carved, diolite, or a mixture composed of equal parts of flasking plaster and stone, is vibrated into the waxed crown. Fill the inside carefully, flush with the edge of the matrix. Allow to set.

7. Invest the crown in the usual manner, using a mixture of 1 part stone to 2 parts plaster. When set, pour the top of the flask, first painting the investment with a mixture of 1 part sodium silicate and 1 part water. The sodium silicate solution makes a fine separating

[1]Kruse, C. R.: Direct Technique for Knife-Edge Cast Crown, DENTAL DIGEST, 46:19 (January) 1940.

fluid and seems to seal the investment, so that the acrylic can be used without contamination. Allow to dry before pouring the upper half of the flask. When set, separate, boil out wax; paint down the inside of the mold with sodium silicate solution, being careful not to have the mixture on the matrix. Paint the upper half of the flask with sodium silicate and water solution. Allow to dry. I have not used any foil; I find that the crown comes out nicely simply by painting the surfaces with the sodium silicate mixture.

8. It is well to cut a circular trap about 2 mm. or 3 mm. from the model to catch the excess acrylic. This trap should completely surround the model and be about 3 mm. deep.

9. Pack the lower half of the flask with mixed acrylic according to the directions given by the manufacturer. Pack to excess, then place a piece of wet cellophane over the acrylic and press the upper half of the flask to place with a press. Open to be sure that there is sufficient acrylic; remove the cellophane; place the flask in the press and tighten well.

10. Place the case in a pan or kettle of cold water and allow the water to come to a boil; then boil for thirty minutes. Cool the case in cold water for about ten minutes, then open; remove; clean out diolite or stone with round burs carefully; finish with discs and stones at slow revolution. Put a final polish on with tin oxide and a chamois wheel.

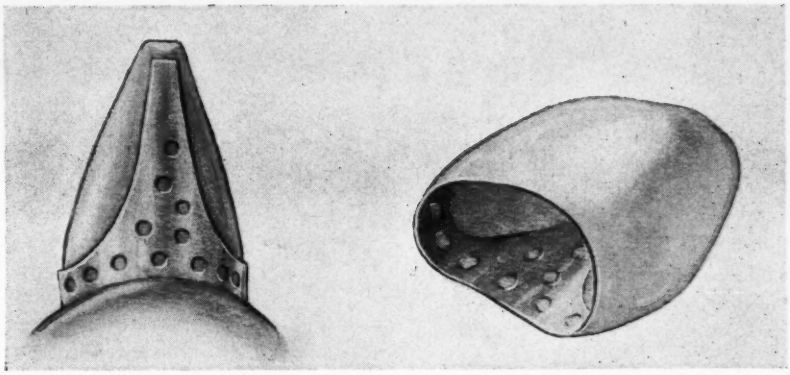


Fig. 2—Matrix design for anterior teeth in which both the labial and lingual portions have been removed. Right, relationship of the matrix in the finished crown.

Constitutional Inadequacy

(An Abstract)

Walter C. Alvarez, M.D., Rochester, Minnesota: Constitutional Inadequacy, J. A. M. A. 119:780 (July 4) 1942.

THE MAIN TROUBLE with many patients is that they are always weak and tired and full of pains and always getting sick in one way or another. Such patients go from one consultant or institution to another in the hope of finding one cause for the trouble which if removed would make them well. The commonest among the diagnoses made to explain their sufferings are: colitis, spastic colon, ptosis, pelvic disease, adhesions, chronic appendicitis, glandular dysfunction, low blood pressure, mild Addison's disease, low blood calcium, brucellosis, and chronic nervous exhaustion. Operations and extensive treatment, however, fail to end these symptoms and make these patients well. Such patients get a raw deal because they are not told the truth, that treatments are ineffectual and operations are fruitless and they are wasting their energy and their money.

The common symptoms of inadequacy are excessive fatigue and a lack of energy and reserve strength; aches and pains everywhere; nervousness, faintness, dizziness, indigestion, poor appetite, loss of weight, regurgitation, a sensitive colon, constipation, palpitation, clammy hands, cardiac neuroses, defective or painful menstruation, dyspareunia, sterility, poor resistance to infection, slow recovery from any illness or injury, insomnia, "chronic fever," "weak eyes," and an irritable bladder.

Many inadequate persons are tired most of the time because they use their brains so unwisely and waste so much energy on foolish thinking, silly worrying, conscience searching, jealousies, flare-ups of temper, conflicts with people, and riots of emotion. Healthy persons would be tired out too if they were to use their brains so uneconomically.

In most cases the primary constitutional inadequacy or weakness is in the nervous system. The main defect in the inadequate persons seems often to be a lack of that something in the brain that keeps most persons feeling well and unconcerned about health. In some cases poor materials seem to have gone into almost every organ of the body. Perhaps the hand of the potter slipped a bit so that the body is poorly proportioned and poorly put together, and unable to stand up well to the strains of life.

Physicians must learn to recognize these persons and their symptoms more often and more quickly so as to save them expense and trouble. Treatment must consist mainly of keeping the patients from doing foolish things and wasting money. They must be taught, if possible, to acquiesce to the situation, to stop hunting for a complete cure, to hoard their energies and to find a job that can be done without too much fatigue.

In times of war every effort must be made to keep the constitutionally inadequate out of the army. All they do is to break down and go on the pension roll.

From the Division of Medicine, Mayo Clinic.

A Short Cut in Denture Construction

J. S. MILLER, D.D.S., Trenton, New Jersey

DIGEST

The conventional procedure in denture construction after the impression has been taken is to pour the cast; when the stone is set, it is separated from the impression, transferred to the articulator in its proper position, and then mounted. These three separate and distinct steps were successfully combined into one operation, and the procedure is herein described and illustrated.

THE USUAL THREE distinct steps following the impression-taking, in denture construction, have been combined into one operation. Ordinarily, after the impression has been taken, the cast is poured; when the stone is set, it is separated from the impression, transferred to the articulator in its proper position and then mounted. In the procedure proposed here, the impression is transferred to the articulator, the cast is poured with the mounting plate attached while the impression is held firmly in its proper position in the instrument, and the cast is mounted after the stone sets in the impression.

Advantages of Combining Steps

It is simpler and more accurate to transfer and center the impression into the articulator than it is to transfer and center the cast.

The method employed in pouring the cast while the impression is in its proper position in the articulator excludes any danger of air bubbles.

Technique

1. With a skin pencil, a mark is made over the head of the condyle.

2. The impression is taken and while the material is setting, the distance is measured between the mark over the head of the condyle and the lip-line by means of a square as shown in Fig. 1, A.

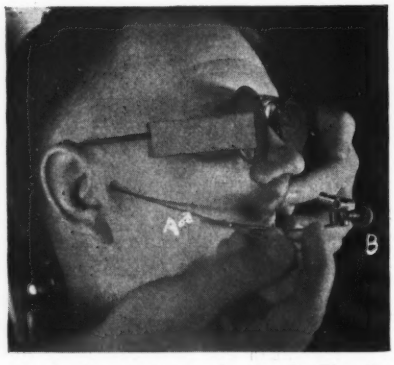


Fig. 1—Impression in the mouth. The distance is measured with a square between the mark over the condyle and the lip-line. A, Head in horizontal position and level set so that the bubbles are in the center and locked, B.

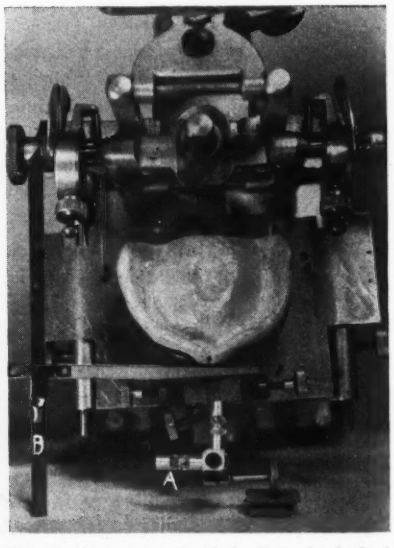


Fig. 2—Impression leveled off to the locked spirit level, A. By means of the same square the distance is measured between the artificial condyle and the lip-line, B.

3. The head is then placed in a horizontal position (not tilted to any side), and the level set so that the bubbles are in the center and locked as shown in Fig. 1, B. The impression is then removed from the mouth and transferred to the articulator (Fig. 2) where it is leveled off to the locked spirit level, Fig. 2, A, and the same measurement is taken from the artificial condyle to the

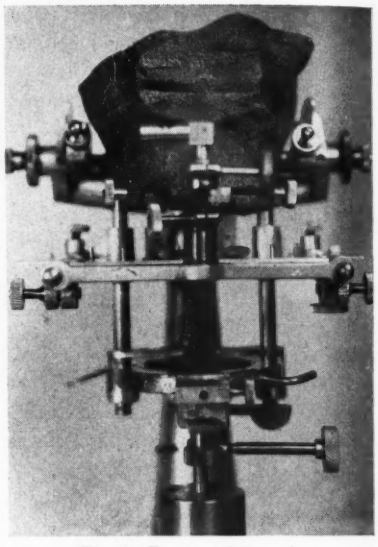


Fig. 3—Bag over impression.

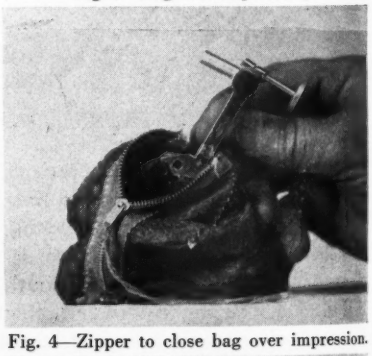


Fig. 4—Zipper to close bag over impression.

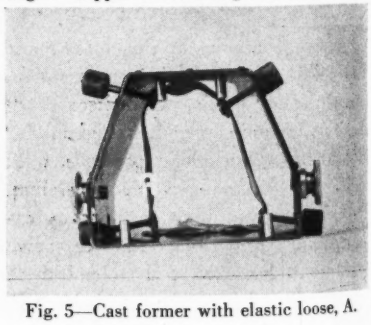


Fig. 5—Cast former with elastic loose, A.

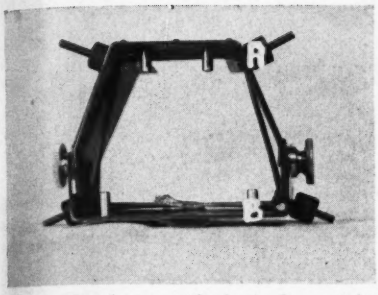


Fig. 6—Cast former with elastic drawn tight by means of elastic holders, A. B represents the posts upon which mounting plate rests.

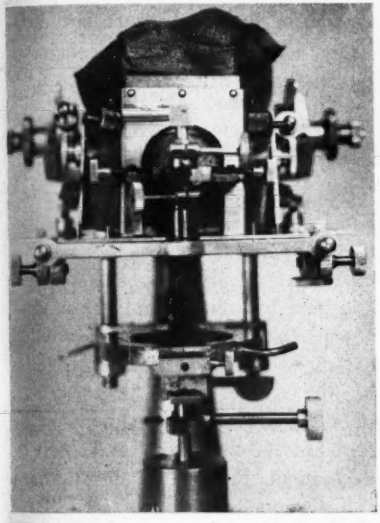


Fig. 7—Cast former over bag with the elastic loosened so that its contraction forces and holds the bag against the entire periphery of the impression.

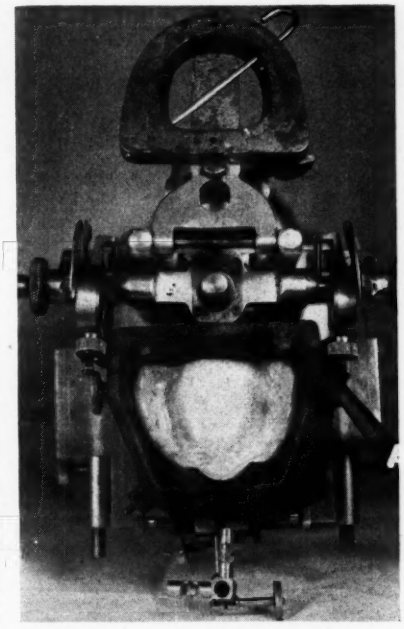


Fig. 8—Upper ends of bag over cast former ready for painting stone over impression with a brush.

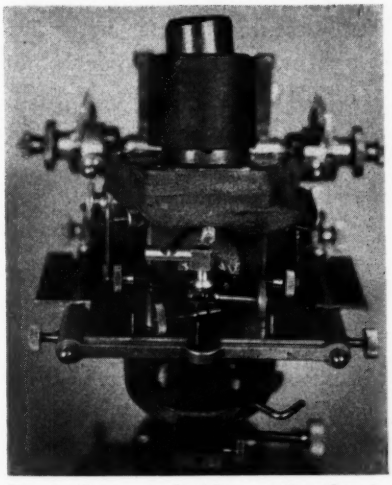


Fig. 9—Cast poured with mounting plate in position and small weight on top of mounting plate.

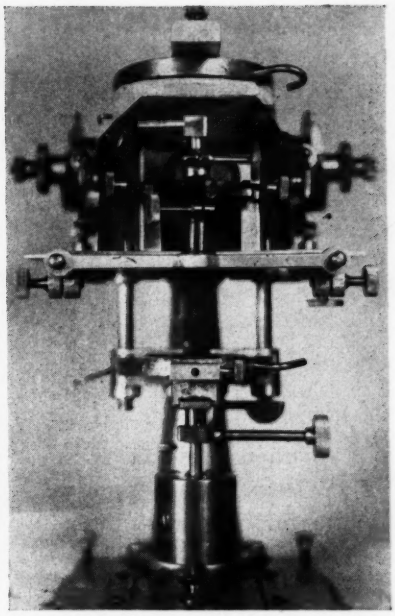


Fig. 10—Weight removed; plaster poured on top of mounting plate and upper member of articulator pressed into it and locked.

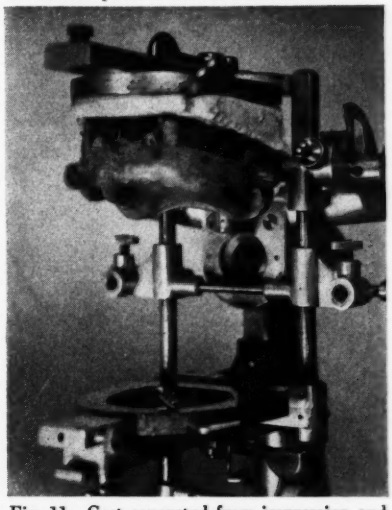


Fig. 11—Cast separated from impression and placed back into articulator with mounting.

lip-line by means of the square, Fig. 2, B.

4. A bag is put over the impression (Fig. 3) and closed by means of a zipper (Fig. 4). The loose elastic in the cast former (Fig. 5, A) is tightened by means of the elastic holders (Fig. 6, A) and placed over the bag as shown in Fig. 7. The elastic is loosened until the bag rests against the entire periphery of the impression and the upper ends of the bag are brought down over the cast former as shown in Fig. 8.

5. Stone is mixed to its proper consistency and by means of a brush (Fig. 8) the stone is carefully rolled over the impression to expel the air (the same as painting an inlay). The entire stone is poured into the impression until the bag is full.

6. The mounting plate is placed over the impression and a small metal weight placed on the top to hold it down (Fig. 9). When the stone is hard the weight is removed.

7. Plaster is poured over the mounting plate and the upper member of the articulator pressed into the plaster and locked (Fig. 10).

8. When the plaster is set the cast former, cast, and impression are removed from the articulator and separated. The cast is placed back into the articulator (Fig. 11).

105 *West State Street.*

Unsolicited Manuscripts Are Welcome

"When you have made an observation of value or reached a conclusion concerning the unusual, publish it. Avoid carrying unpublished knowledge to the grave!"—Sir William Osler.

Nasoendopharyngeal Intubation for Dental Surgery with Nitrous Oxide-Oxygen Anesthesia*

MAURICE P. COOPER, M.D. and LOUIS G. HILL, D.D.S., B.S., Toledo, Ohio

DIGEST

Maintenance of an open airway is absolutely essential in every type of anesthesia. Intratracheal intubation is the answer to the ideal airway in dental surgery. Direct intubation demands good relaxation and a time interval to be successfully performed. Unfortunately, nitrous oxide does not give adequate muscular relaxation, nor sufficient time interval for direct intubation, but it does afford anesthesia deep enough for transnasal intratracheal intubation.

The use of the endotracheal method for various operations suggested the use of the same kind of soft rubber tube for routine use in the dental office or clinic. The tube employed is shorter than the endotracheal catheter, and it extends only through the nose into the lower part of the pharynx. It requires no particular skill to insert.

Intubation of several thousand subjects with this nasoendopharyngeal tube has shown that this method provides an airway almost equal to that of the endotracheal route. Certain precautions and directions, however, must be observed, and these are explained in the text.

MOST OF US KNOW that it is rather difficult to administer a general anesthetic for dental surgery without having some degree of obstruction to the airway during operation. The normal patency of the air passages will be diminished: if the head is thrown too far forward or backward (Figs. 1 and 2); if the mouth pack is pushed into the throat; if the tongue falls backward; or if blood, pus, mucus, or broken teeth get into the airway. The dentist cannot entirely prevent some degree of obstruction, because he has to work with the mouth open, and in certain patients, this is all that is necessary to produce an occlusion of the air passages. If the air passages are partly blocked during anesthesia, there will not be the proper exchange of gases, and consequently, the patient suffers from an inadequate supply of oxygen and an excess of carbon dioxide in the blood and tissues. McKesson[1] states, "that in probably 90 per cent of those patients who have died under gas-oxygen anesthesia, during dental operations, one or more of the . . . respiratory obstructions has been the cause of death. A free air passage is the most important of all matters relating to the technique of administration."

The question arises, "How can the air passages be kept clear and unobstructed, regardless of the positions of packs, tongue, or head?" Intratracheal intubation is the answer to the ideal airway in dental surgery.

Preparation

Several factors must be known before the anesthetic is administered: (a) which side of the nose has less obstruction; (b) which side of the nose has the larger opening; (c) what length and bore of tubing should be used in any particular case. This information may be ascertained readily by examining the nose carefully (Fig. 3). . . . Place the fingertips of one hand on the forehead and the thumb on the nose of the patient. Retract the nose upward and from side to side, and observe which side has the larger and which less obstruction.

From this observation decide the caliber (bore) of the tube to be employed. The length of the tube may be determined, in adults, only by measuring the distance from the ala nasi (Fig. 4) to the tragus of the ear (Fig. 5). The correct length of the tube should be about 1½ times this distance (Figs. 6 and 7), roughly, between 6 and 8 inches. Lubricate the lower inch of the tube with surgical lubricant. Do not apply the lubricating jelly on the remaining part of the tube as this makes handling of it more difficult (Fig. 8). Various sizes and lengths of tubing should be kept on a table within easy reach of the anesthetist, in case the tube planned for use proves too long, too small, or too large (Fig. 9).

The size of tubes, for adults only, should not be any smaller in bore than 30 F., while the largest may be 36 F., 38 F. or 40 F. or occasionally larger. Four lengths of tubing for each bore usually suffices; that is, the tubes

*Reprinted, and cuts reproduced, by courtesy and with permission of Current Researches in Anesthesia & Analgesia, (21:159-165, May-June, 1942), with slight rearrangement.

[1]McKesson, I. E.: Handbook, Nitrous Oxide and Oxygen Anesthesia in Dentistry, page 11. Clement, F. W.: Nitrous Oxide-Oxygen Anesthesia, Philadelphia, Lea & Febiger, 1939, pages 111-116. Cooper, M. P.: Nasoendopharyngeal Intubation with Nitrous Oxide-Oxygen Anesthesia in Dental Surgery, J. District of Columbia D. Soc. 15:2, 22-25 (March) 1941.

Fig. 1—Head too far forward.

Fig. 2—Head too far backward.

should be 5.5, 6.0, 6.5 and 7.0 inches respectively in length and the gauge should be approximately 30 F., 32 F., 34 F., 36 F., 38 F. and 40 F., in order to meet various conditions (Fig. 9).

The patient should be seated properly in the dental chair before the anesthetic is given. Malpositions of the patient may be prevented by placing the back of the chair at right angles to the seat (Figs. 10 and 11). Have the patient's hips placed as far back on the seat as possible (Figs. 12 and 13). The headrest should be placed behind the ears so that the head and neck are in a straight line with the body (Fig. 14). Show the patient how to clasp hands together (Figs. 15 and 16), and rest them in the lap. Restraining straps, if employed, should be applied only loosely to prevent apprehension on the part of the patient (Figs. 16 and 17). Later on, when the patient is unconscious, the straps may be tightened. They should be removed before the patient awakens.

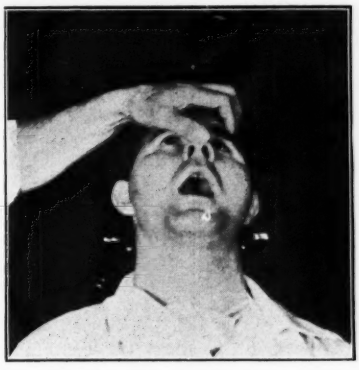
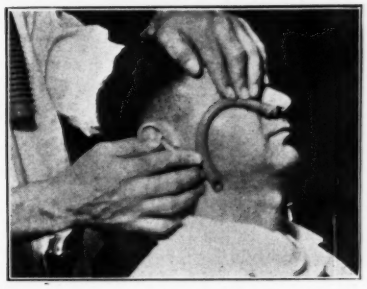


Fig. 3—Examination of nares.

Fig. 4—Showing ala nasi.

Fig. 5—Showing tragus of ear.



Figs. 6 and 7—Measuring the tube.

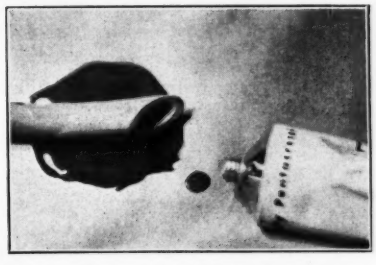


Fig. 8—Lower end of tube lubricated.

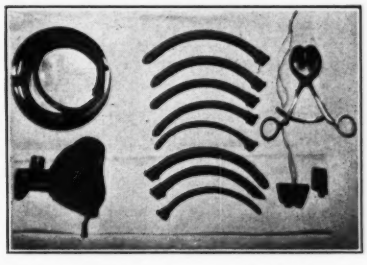


Fig. 9—Tubes, container and mouth props.

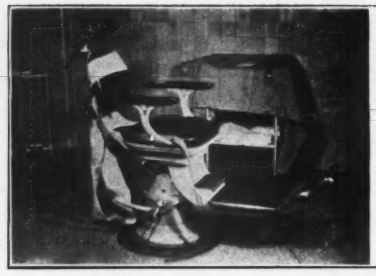
Technique

1. The mouth prop should be placed between the teeth of the upper and lower jaw.

2. The subject should be anesthetized in the usual manner, that is, with the face mask or nasal hood.

3. After establishing the surgical plane of anesthesia, grasp the tube, previously selected and lubricated, with the right (or left) hand between the thumb and middle, ring and little fingers (Fig. 18), having the index finger over the large flanged end of the tube. Insert the beveled end of the tube, curve downward, into the nostril (Fig. 19), using the index finger to push the tube in place (Fig. 20). The tube should enter the nasal cavity below the inferior turbinate bone and above the floor of the nose in order to prevent (Fig. 20) bleeding and obstruction. Do not use force. If an obstruction is encountered, change to the other side of the nose or use a smaller size tube or both.

4. After the tube is in position (Fig. 21), replace the nasal hood and pack the throat with a large piece of folded gauze. Never push the pack downward as it may project between the end of the tube and the larnyx and so cause



Figs. 10 and 11—Back of chair at right angle to seat. Restraining straps are also shown.

obstruction. To prevent this, push the pack straight back against the soft palate and uvula. To be efficacious, the pack should be distal to the molars. This pack is not intended as a sponge to absorb blood and mucus.

5. When the operation is completed, remove the pack and then the tube.

Purpose and Precautions

The object in using the tube is to obtain an open airway, one free from all obstruction. To select a tube of improper length and diameter will defeat its purpose, because it may give the anesthetist a false sense of security. Do not be afraid to use a large bore tube; a 36 F. (French) bore from 5½ to 7 inches in length can be employed in most cases. The tube must not be inserted before surgical anesthesia is realized. The pack must be inserted well back into the throat, tight enough to stop all leakage of air about the tube. Nausea, retching, or even vomiting may be provoked if the anesthesia is "too light," because the tube and pack lie in the area in which they stimulate the "gag" reflex.

Premedication

Routine use of pre-anesthetic sedatives should be encouraged, for they not only relieve fear and apprehension, but also assist in producing smoother anesthesia. Nembutal has been used in several thousand cases in our clinics. It has been found that the side-effects and after-effects could be held at a minimum if the following dosage was followed closely: for women, three-fourths grain; for men, from 1 to 3 grains, given one-half hour before operation. Comparison between the premedicated and non-premedicated cases showed that the majority of the former, will tolerate from 2 per cent to 25 per cent more oxygen in the anesthetic mixture.

Fig. 12

Fig. 13

Fig. 14

Figs. 12, 13 and 14—Proper position of head, shoulders and hips in the chair with restraining straps.

Fig. 15—Showing the patient how to clasp hands together.

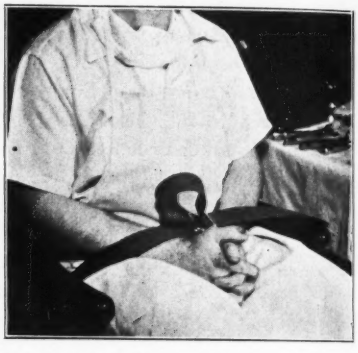


Fig. 16—Hands in lap with restraining strap in place.

Fig. 17—Restraining strap around shoulders.

Fig. 18—The proper way to grasp the tube for insertion.

Advantages and Disadvantages

Advantages — The advantages in using the tube are: (1) Establishment and maintenance of an open airway; (2) smoother anesthesia with greater ease of control; (3) rebreathing of the

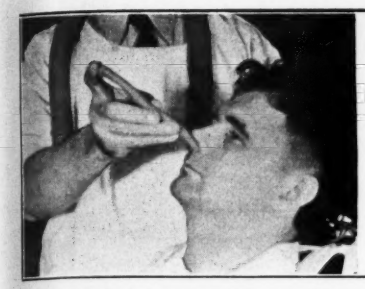


Fig. 19—Correct plane for the insertion of tube.

Fig. 20—Using index finger to push tube into nose under inferior turbinate bone and along floor of nose.

gases; (4) administration of a higher percentage of oxygen in the anesthetic mixture than is otherwise possible; (5) reduced possibility of air dilution of the anesthetic mixture; (6) less actual support of the mandible required by the anesthetist during the operation; (7) less tendency of the mouth props to slip, which may result in lacerated and contused lips; (8) better muscular relaxation; (9) economy of gases.

Disadvantages—Bleeding may occur from the nasal mucous membrane owing to improper or forceful insertion of the tube. Edema of the mucous membrane may be produced, especially in patients suffering from chronic rhinitis.

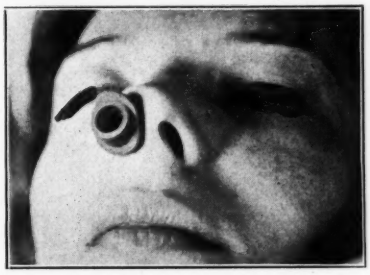


Fig. 21—Tube in the nostril.

In such cases the symptoms may be aggravated and a nasal discharge may be present for several days.

Care of Tubes

The tubes should be cleaned thoroughly with soap and water after each case. A small test tube brush will aid in removing blood and mucus lodged in the lumen. Before using the tube again, it should be sterilized by boiling for five minutes or by placing it in a solution of mercuric cyanide 1:1000 for thirty minutes. If the operator chooses the latter method of sterilization, he should be sure to wash off with water as much cyanide as possible to prevent any irritation.

When the tubes are not in use, they should be stored in an airtight container (Fig. 9) away from heat and sunlight. Rubber tubing deteriorates rapidly in the presence of heat, sunlight, and dry air.

2228 *Ashland Avenue.*

Dentistry As a Health Service:

Textbooks on dental pathology do describe caries as a pathologic condition, but the absence of teeth is not so considered or even mentioned in that connection. This separation of soft tissue and bone pathology, from masticatory and tooth pathology, is so complete in the minds of teachers and dentists that only recently a prominent dean of a dental school ridiculed the idea of a missing tooth being considered in any sense a pathologic condition—all this, despite the fact that the function of mastication is definitely impaired or endangered by such a condition.

So long as the student in school is taught to think in terms of "pathology" when he is treating and dealing with gingivitis, pyorrhea, abscesses, tumors, neoplasms, but is allowed, if not actually taught, to think in terms of "operative" or "prosthetic" dentistry when he is treating and dealing with caries and missing or misplaced teeth, his mind is not imbued with a full, or any, appreciation of the health significance of his principal field of endeavor, maintaining and restoring the masticatory mechanism, a healthy functioning mouth. Until that lack of appreciation is corrected, that great mirror, the public mind, will not give back a desirable and pleasing reflection.

This lack of appreciation of dentistry as a health service can be quickly and effectively eliminated by the process of teaching dentists themselves to think in terms of the health, and not the cosmetic, benefits of dental remedies. When the time comes that dentistry is truly administered as an effort to maintain and restore the function and well being of the mouth as an integral part of the body, dental men will think in medical terms and medical men will think in dental terms without effort, conflict or confusion. God speed the day; humanity needs it.

—B. B. McCollum, D.D.S., Los Angeles

A Simple Method of Relining Metal Partials

HARRY L. ARONSON, D.D.S., Chicago

DIGEST

A simple procedure is outlined and illustrated for the use of acrylic in the correction of tissue absorption under the free ends of metal partial dentures.

TISSUE ABSORPTION under the free ends of metal partials can be easily and economically corrected with the acrylics, either clear or colored, in the manner to be described here:

Technique

1. Examine the mouth. If the saddle area needs to be extended, do so with compound.

2. If there is a great deal of absorption, flow in carding wax.

3. Establish occlusion and vertical dimension (Figs. 1 and 2).

4. Remove the case from the mouth. Add any of the zinc oxide pastes.

5. Insert the case back into the mouth and have the patient bring the jaws into occlusion. Remove from the mouth as soon as the material has set.

6. Trim the excess impression material from clasps and bars. Run a stone cast with contact on the bars and clasps to permit removal and reseating of the case.

7. Remove the case from the cast. Remove the impression material from both the case and the cast.

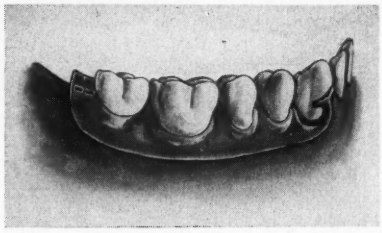


Fig. 1—Note settling. Line of occlusion is lowered.

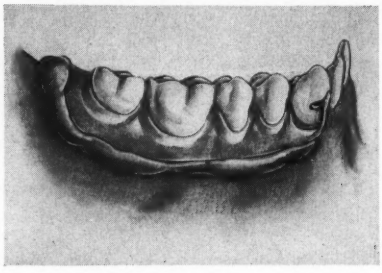


Fig. 2—Occlusion restored.

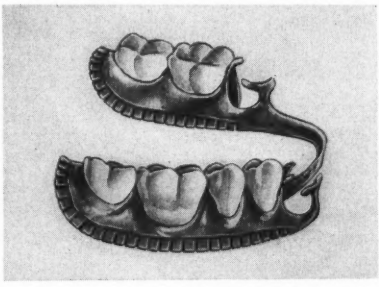


Fig. 3—Slots, 2 mm. or 3 mm. deep, cut with separating disc at 3 mm. or 4 mm. intervals around periphery of saddles on buccal and lingual. A finishing line may be ground in if desired.

8. With a separating disc, cut slots 2 mm. or 3 mm. deep, at 3 mm. or 4 mm. intervals, around the periphery of the saddles on the buccal and lingual. A finishing line may be ground in, if desired (Fig. 3).

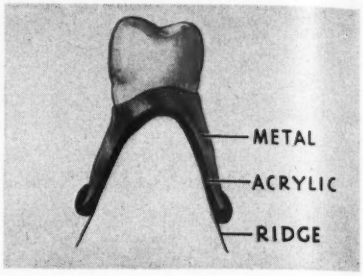


Fig. 4—Cross section.

9. Tin-foil the cast. Reseat the case and wax to the finishing line or 1 mm. above the slots.

10. Invest in the lower half of the flask and tin-foil. Finish investing, eliminate the wax, and pack with acrylic. Cure and finish as usual.

Relining cases will eliminate loose-clasped teeth which become fulcrums. It will also eliminate sore spots that develop at the lingual of lower anterior teeth.

Relining upper cases will correct the burning sensation caused by pressure of the anterior part of the case against the anterior palatine nerve. This nerve lies lingual to the upper central incisors at the median line.

The technique recommended may be employed in gold partial denture restorations, plastics, vulcanite, or any of the known partial denture materials, but it is especially applicable to chrome alloy cases, for which heretofore there was no known means of relining.

2922 *East Seventy-Ninth Street.*

WAR BOND AWARDS!

The DENTAL DIGEST is continuing its plan to offer a $100 United States War Savings Bond twice each year, in January and July, to the author of the best article published in this magazine in the preceding six issues. The "best" article is selected by a vote of the readers of this magazine who will have an opportunity to vote again in December.

AN ADDITIONAL AWARD OF A $50 UNITED STATES WAR SAVINGS BOND WILL BE MADE TO THE AUTHOR OF THE BEST LETTER EXPLAINING HIS SELECTION FOR THE $100 BOND AWARD.

The Editor's Page

WITH THE CANCELLATION of the Boston meeting of the American Dental Association it becomes the responsibility of the dental publications to keep before the profession the latest developments in war dentistry and the collateral subjects of war medicine and surgery. The Boston meeting had been planned to emphasize military dentistry in all its branches. The Harvard Medical School had planned to offer a special intensive course on war dentistry, medicine and surgery to those attending the Boston meeting, after the regular sessions of the convention had been concluded. The dentists of the country will now have to depend on books, dental journals, and the meetings of the local dental societies to bring their knowledge in step with advancing developments in care of the injured and sick, to keep them in readiness for the expanding scope of dental services.

The National Research Council has recently prepared a MANUAL OF STANDARD PRACTICE OF PLASTIC AND MAXILLOFACIAL SURGERY[1] and it is hoped that this is the forerunner of many manuals on standard practice to be offered. The National Research Council wisely chose an established medical publishing house for publication of this timely book, which should insure its necessary distribution. The Subcommittee on Plastic and Maxillofacial Surgery of the Committee on Surgery of the Division of Medical Sciences of the National Research Council is made up of dentists and physicians who cooperated in the preparation of this book—an example of the kind of cooperation that now exists between the medical and dental professions in equipping their members for war service.

We may expect that modern war with the terrific bombardment of civilian as well as military populations, with the crashing of planes and explosion of tanks will produce more facial injuries than were experienced in any previous war. Dentists will be needed in the days ahead to help a great deal in facial reconstruction. This new book on plastic and maxillofacial surgery is a fine preparation for that task. Immediate emergency treatment of facial injuries, moreover, if administered expertly and with a knowledge of fundamental principles may minimize the degree of resulting disfigurement.

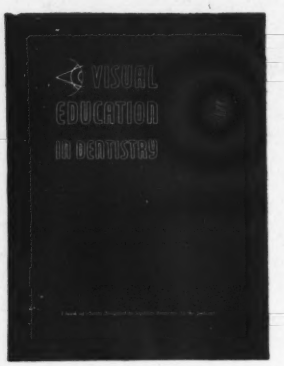
In modern warfare there are no longer engagements of relatively few men on a fixed battlefield. War is no longer circumscribed by the muscles of men and of horses. The internal combustion engine has made warfare global in character. We are now fighting on all the continents and all the seas. The expansion of the methods of war is reflected in the dentist's relationship to warfare. No longer is he expected to be a person serving behind the lines to perform emergency extractions of teeth and the temporary replacement of dental structures. His field is likewise extended. He is being trained to serve as an auxiliary medical officer who will enter the scene of combat to aid medical officers in the treatment of shock, the arrest of hemorrhage, the injection of blood plasma, the administration of anesthetics, the immobilization of fractures, the control of military sanitation.

The dentist, whether he is in civilian life or is already in Service must know all the phases of his own calling, all the methods of modern dentistry; but he must also be acquainted with the principles of tropical medicine, of military psychiatry, of aviation medicine. He may be sent to far off places where he will see soldiers entirely unaccustomed to equatorial living, suffering from tropical diseases, some of which may have mouth manifestations. He will come across soldiers and sailors who under the stress of warfare may suffer psychotic states. Even to treat the dental disturbances of these men, the dentist will need to know something of the principles of military psychiatry. It has already been shown that dentistry is linked with aviation medicine. Willhelmy[2] published in this magazine, in the dark month of Pearl Harbor, a far-seeing article showing the relationship between overclosure of the mandible to ear pains while flying. With the condylar head impinging on the structures of the eustachian tube to cause a diminution in the lumen of this tube, rapid adjustments to external ear pressures are difficult. The flyer making a rapid descent, if he has a closure of the eustachian tube owing to overclosure of the mandible, experiences pain, stuffiness in his ears, and often dizziness. While we are preparing thousands of men to be flyers, it will be necessary for dentists to look into the dental apparatus, and overclosure of the mandible is one of the many defects that dentists should be alert to detect.

Publications in this country, the professional journals of the Army and Navy and of civilian life, have this urgent function in wartime—to present pertinent information to the professions. Local dental societies should likewise share this service. There is hardly a community in the country that does not have medical personnel well enough equipped to teach fundamental courses to dental groups. Now in midsummer, while program chairmen are making arrangements for the coming year, they should be mindful to plan their programs so that all developments in war medicine and surgery can be made available to dentists.

[1]Subcommittee of the National Research Council and Representatives of the Medical Department, U. S. Army: Manual of Standard Practice of Plastic and Maxillofacial Surgery, Philadelphia, W. B. Saunders Company, 1942.

[2]Willhelmy, Glenn E.: Relationship of Overclosure of Mandible to Ear Pains While Flying, DENTAL DIGEST, 47:544 (December) 1941.



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The complete edition of *Visual Education in Dentistry* comprises 30 charts, most of which are printed in full color. The charts are invaluable in your patient-education program; ideal for use at the chair; effective material for your reception room table. If you have never had a copy, or if your present copy is badly worn, you are entitled to the complete edition at the special subscriber price of $1.00. *The coupon below is for your convenience.* $2.00 per copy to non-subscribers unless purchased with a subscription.

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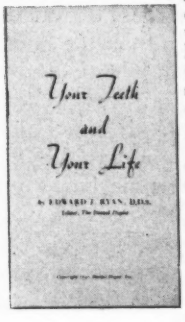
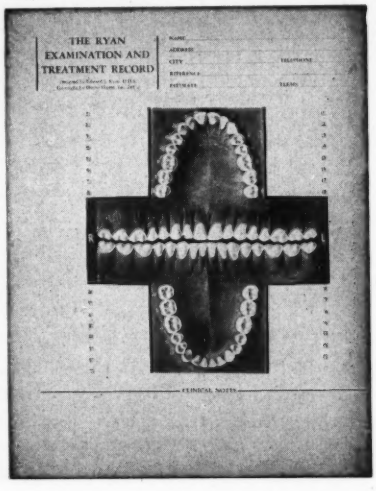
The new booklet, *Your Teeth and Your Life*, illustrated here, is intended primarily for patient distribution. It is written entirely in lay language. Charts tell the essential story. Many dentists are using it (1) as a monthly statement enclosure; (2) in the reception room; (3) as an enclosure with patient recall cards, etc. Prices, 25 for $1.00; 100, $3.00. *The coupon below is for your convenience.*





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Each of the items listed on this page is strictly ethical, and worthy of consideration for use in your patient-education program. Build now for the future by outlining a definite educational program. Carry the program out month after month. Show your patients that neglect costs more than treatment, in pain, in time, and in money. TO HELP CONVINCE THEM, SHOW THEM. Patient-education material is an economical means of doing this.

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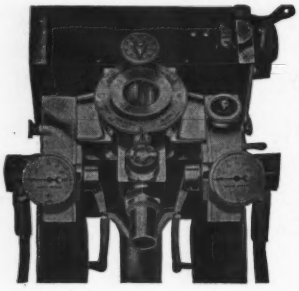

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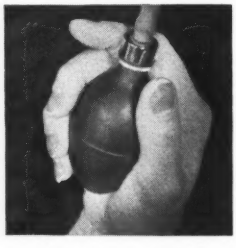

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Contra-Angles

O'Hare and O'Hara . . .

The O'Hare and O'Hara boys have done pretty well in this war. Everyone knows about the first boy who knocked down six planes carrying the setting sun of Japan. The other, O'Hara, is a small town dentist. Janesville, Minnesota had a population of 1,296 before Donald O'Hara turned off his unit, hung up his gown, and went to war. When he entered the Army, he had no way of knowing that some day he would be the only American Medical Department officer in the whole of Burma or that it would fall to his lot to act in the rôle of general surgeon. But such he did and for such meritorious service he was awarded the Order of the Purple Heart by Lieutenant General Joseph Stilwell. That day in Burma when O'Hara received the message from his commanding general to take over the duty of general surgeon, which meant the performance of operations by candle light on the porches of native dwellings, he must have felt as inadequate as you or I would feel under similar circumstances.

It is not my pleasure to know Donald O'Hara but I imagine that he had the same type of dental training that most of us have received and that his experience since graduation has not been much different from ours. No one among us can say who may be called upon to perform a function similar to the one that O'Hara received the call to perform. Now more than ever, therefore, it is the duty of dental colleges and dental societies to train dentists, particularly those in the military age under 45, in the fundamentals of war medicine and surgery.

I have before me a new book, AMBASSADORS IN WHITE, which is the story of American tropical medicine. Thousands of our troops are going to be fighting in the tropics; they are bound to pick up many types of tropical disease. Many of them unhappily will be carrying these diseases throughout the rest of their lifetime. Many of our dental colleagues will be called to service in the tropics. We need to know more about tropical diseases in general and of their mouth manifestations in particular. In The Editor's Page of this issue we have emphasized the importance of training in other fields: aviation medicine, military psychiatry, military sanitation, traumatic surgery. Some dental society is going to be inspired to put on an intensive course on these subjects and the initiators will be surprised at the enthusiastic acceptance it will receive from the dentists of the country.

Delayed Dawning . . .

Have you ever received a suggestion, the idea of which lingered a long while before its worth was suddenly realized?

(*Continued on page* 386)

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INSURES BETTER IMPRESSIONS

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Up in Toronto last January when speaking before the Academy of Dentistry, one of the members proposed a campaign wherein every member of the dental society would make a resolution to write to a dental colleague in the Service at least once a month. It has taken a mental lag of eight months for me to translate this excellent idea into an articulate acceptance. Many of our friends and colleagues who lived fully in their civilian lives find themselves now forlorn and isolated fellows in Service. An occasional postcard to them, a letter now and then, would do a lot of good. I am not very proud of my own efforts as a correspondent to dental friends in the forces, but I am going to try to do better and write at least one letter a week to some dentist in the Service. I hope many other dentists will make a similar resolution.

Fuddle Fellows . . .

If you have never met Doctor I. Q. Fuddle, it is your loss. This dentist from down Arkansas way drops words of wisdom in the *Journal of the Arkansas Dental Association*. His latest undertaking is the organization of the Fuddle College of Dentists. But let's let him do his own announcing:

"I take great pleasure in announcing the opening of the Fuddle College of Dentists.

"Beginning July first the Fellowship Committee will award Fellowships in the College on receipt of proper application from outstanding dentists.

"A 'proper' application is one that is accompanied by fifty cents, either in stamps or money order. Checks will not be accepted. An 'outstanding' dentist is one who has actually practiced dentistry at some time and who has a half dollar to spare.

"A Fellowship in the College entitles the fellow to write ffcd in capital letters after his name. Each capital letter should be followed by a period, thus: F.F.C.D. Simple, isn't it? That's what you get for your four bits."

This new College of Fuddles is going to give some pretty stiff competition to the two other more pretentious and expensive Colleges. The boys who have spent their $100 to belong to the American College of Dentists plus the extra

Will You Help A Courageous Fellow Dentist?

THE DENTAL DIGEST wants to help a brave dentist by urging that you buy from him something that you would likely be buying anyway — magazines for your reception-room table.

Doctor Russell Panzica has been ill, and unable to practice dentistry for a long time. A limp right leg and a numb left hand—think what that would mean to you.

With rare courage, he has been earning an income for his wife and two-year-old boy. "I will see it through—come what may," he says. Doctor Panzica is selling *Reader's Digest* and *Coronet* subscriptions. You can help him "see it through" by taking a few minutes to send him your own subscriptions, at publishers' regular rates:

The Reader's Digest: $3 yearly; $5 for two years. Gift subscriptions, for boys in military service, are only $1.50 each.

Coronet: $3 yearly; $6 for two years. Special: $1 for 6 months.

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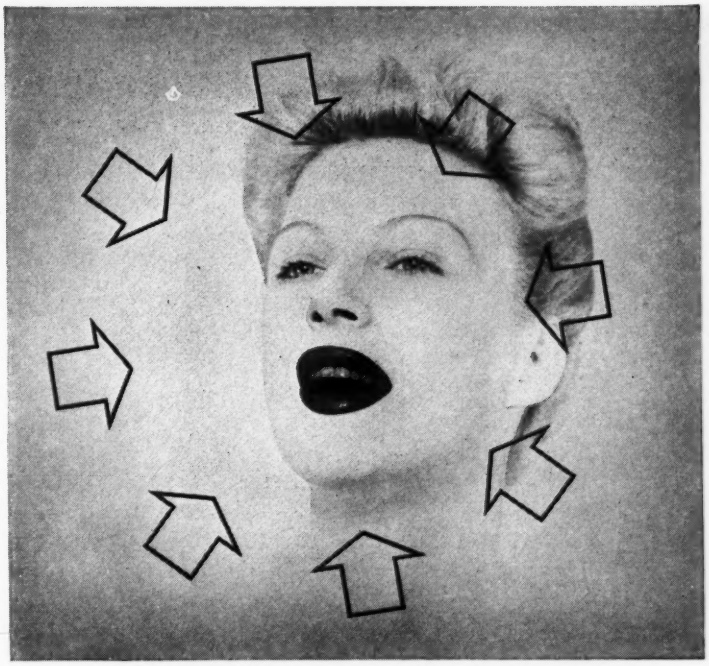

'S.T. 37' ANTISEPTIC SOLUTION

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expense for cap and gown trappings will feel that their elaborate Torch and Mace Ceremony is heavy tariff. And certainly the boys who belong to the International College of Dentists will think that their gold key is mighty costly ornament when they compare it with the modest fee of fifty cents to belong to the Fuddle College of Dentists which bestows the same number of capital letters with a period after each for affixing to one's signature. A good many of the lads who appear so scholarly at the convocations of the American College of Dentists are frightfully disappointed that the Boston meeting has been called off, because now they will have to forego the lift that the cap-and-gown affords.

The two Colleges in dentistry were doubtless hopeful attempts to lend the aura of scholarship to a young profession. In truth, each of these Colleges has done some fine work. But they have grown too pompous and take themselves too seriously, swaggering in their caps and gowns and twirling their golden keys. They grow ludicrous. And Doctor Fuddle is helping the fun-poking.

It may have been observed that the initials, the four capital letters with a period after each (F.A.C.D. or F.I.C.D., or even F.F.C.D.) never appear after an author's name in this magazine. That doesn't mean that we do not have plenty of writers who belong to these Colleges. Only earned degrees and those issued by accepted institutions of learning are acceptable to appear after a name. Because a dentist belongs to the Elks, we do not put B.P.O.E. after his name, although the Elks represent a good and valid organization. B.P.O.E. has nothing to do with a person's qualifications to practice dentistry or to write on dental subjects. Neither unfortunately does F.A.C.D. or F.I.C.D. reflect a person's ability to comment authoritatively on dentistry or to practice in the profession. Both these so-called titles are possessed as "honorary" by men who are not dentists as well as by dentists. These so-called degrees do not represent letters of accomplishment, but often are symbols of political influence.

In medicine, the situation is somewhat different. The American College

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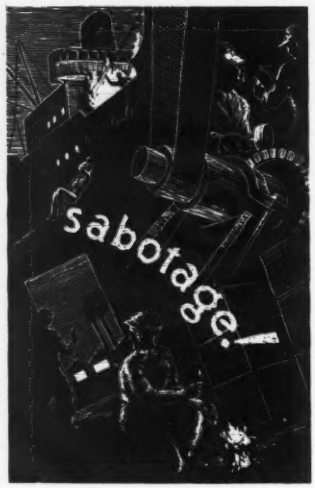
In your ORAL HYGIENE this month



You Can Help Fight the Saboteurs

WHILE THE NAZI saboteurs were on trial in Washington last month, ORAL HYGIENE was printing this month's issue, featuring "What the Dentist Should Know About Sabotage and Espionage." The article points out that every dentist should be "an important and constructive factor on this home front. . . . The dentist, in his day-to-day association with his patients, has an opportunity to offset enemy attempts at human sabotage." Don't miss this fascinating article.

In "Hollywood Revises Dental History," Doctor Max E. Soifer takes up the cudgels for dentistry's Horace Wells, in asking for fair treatment in filming the story of the discovery of anesthesia. Doctor Soifer is the librarian of the Hartford Dental Society.

"Dental Officers in Training," featured this month, is a picture spread presenting intimate incidents in the lives of Army Dental Corps members.

"The Rural Dentist Looks at War," by Doctor H. S. Huxtable, deals with country dentists' special problems in a wartime world.

This month's editorial asks for government consideration of the fact that "Our Navy Dental Corps Needs an Admiral."

And, this month, too, ORAL HYGIENE'S well-known departments: Ask ORAL HYGIENE, Technique of the Month, This is YOUR Business, Military and Defense News, Dentists in the News, Laffodontia, and the Corner.

In your August

Oral Hygiene

of Surgeons and the American College of Physicians are open to all physicians who can meet the qualifications and these qualifications are entirely professional. If a man has the experience and the knowledge and the ability to submit careful and accurate case reports and histories acceptable to the officers of the American College of Surgeons or the American College of Physicians, he is elected to Fellowship in these respective Colleges. It isn't a matter of being nominated by the Regent to pay off a personal or political debt or to lend prestige to the membership roster.

Many of the truly eminent men in dentistry belong to both the American College of Dentists and the International College of Dentists. Both these organizations have undertaken some worthwhile projects, but both incite skepticism and misgivings because they are shot through with irrelevancies and pretensions and membership in them is not based exclusively on rigid professional qualifications. If their purposes and usefulness were clearly defined and demonstrated as unequivocally good, the fun-poking would automatically cease.

A Little Consistency, Please . . .

I am not one to propose the stranglehold of censorship but I would be grateful to the radio announcers if they would dam their spate of words and I will be deeply appreciative of Elmer Davis when I see his coordination taking effect. Within an hour I heard one announcer describe the desperateness of the rubber situation—that we should knock the old heels from our shoes, the rubber bands from our wallets, the caps from our bottles. He was followed by an optimistic commentator who said that everything now looked pretty rosy on the rubber front. One of these talkative fellows was wrong. Either we are in a tight spot with respect to our rubber supply or the situation is not desperate at all. So long as the confusion exists and we are not sure what to do, we take the easy course and figure we will use our tires and we will have our fun as long as we can. That may not be patriotic but it is the normal product of confusion.—E. J. R.

For the want of a ~~nail the shoe~~ tooth good health *was lost,*

For the want of ~~a shoe the horse~~ good health a worker *was lost,*

For the want of a ~~horse the rider~~ worker production *was lost,*

For the want of ~~a rider~~ production *the battle was lost,*

For the want of a battle ~~the kingdom~~ freedom *was lost . . .*

And all for the want of a ~~horseshoe nail.~~ good sound tooth

Poor Richard's Almanac

SORRY, MR. FRANKLIN

Sorry, for the liberties taken with your counsel of caution—remember the little things. And yet, as apologetically amended, this is today's creed with an ever-increasing number of G-E Model CDX X-Ray Unit owners. They *are* remembering—remembering that tooth infection often comes to light as arthritis, low back-pain, and other types of discord to the humming of industry's wheels—wheels that sing our enemies' swan-song.

These x-ray-wise dentists use the CDX to reveal a multitude of potentially disabling conditions. They're not waiting until stiffness slows the nation's fingers—until backs won't bend—until reduced production pinches where it really hurts. They're correcting the causes of worker disability *before,* not after, lost man-hours are registered on the nation's time-clock.

To all who would learn how the CDX can better help themselves and their patients, a note to Dept. P18 will bring immediate information.

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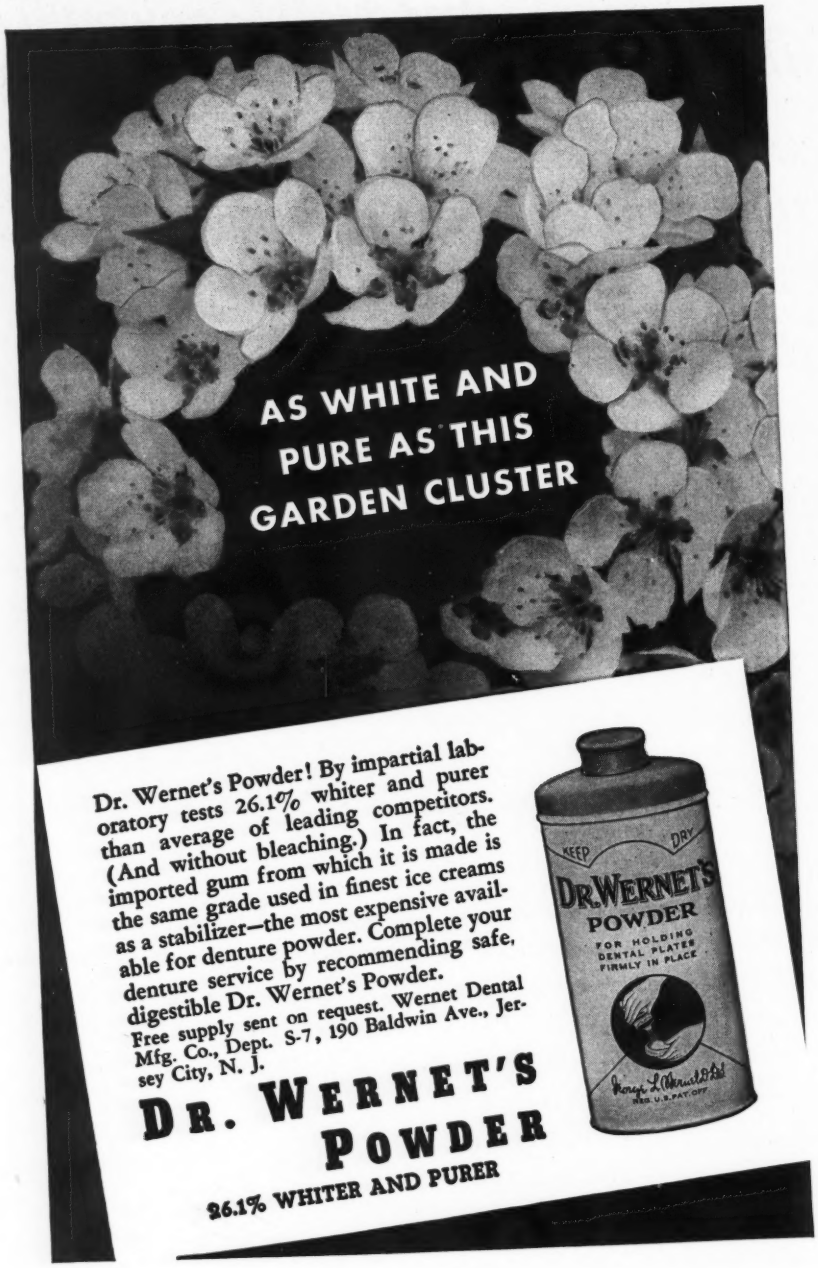
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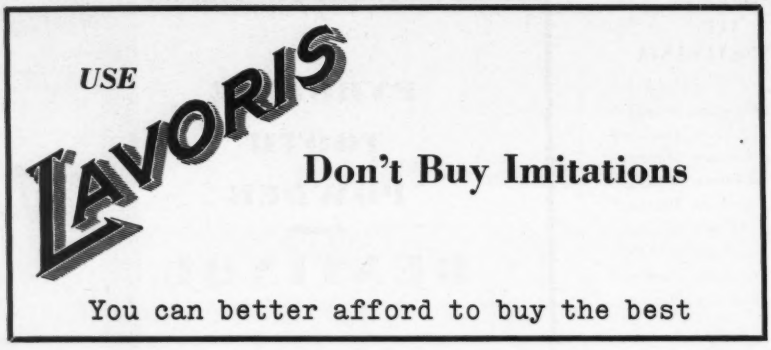

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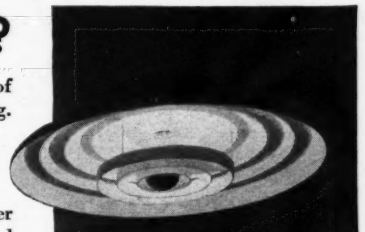

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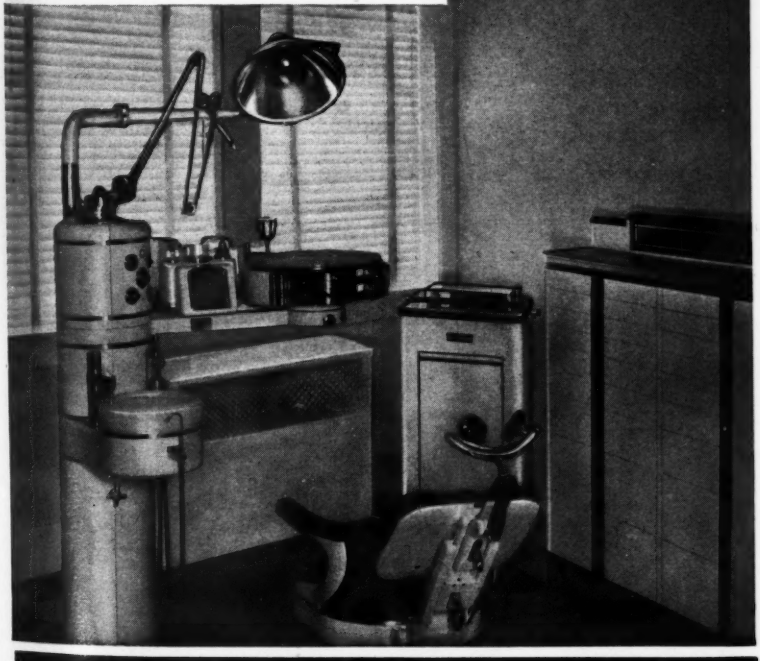

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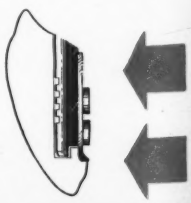

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